

Figure 1

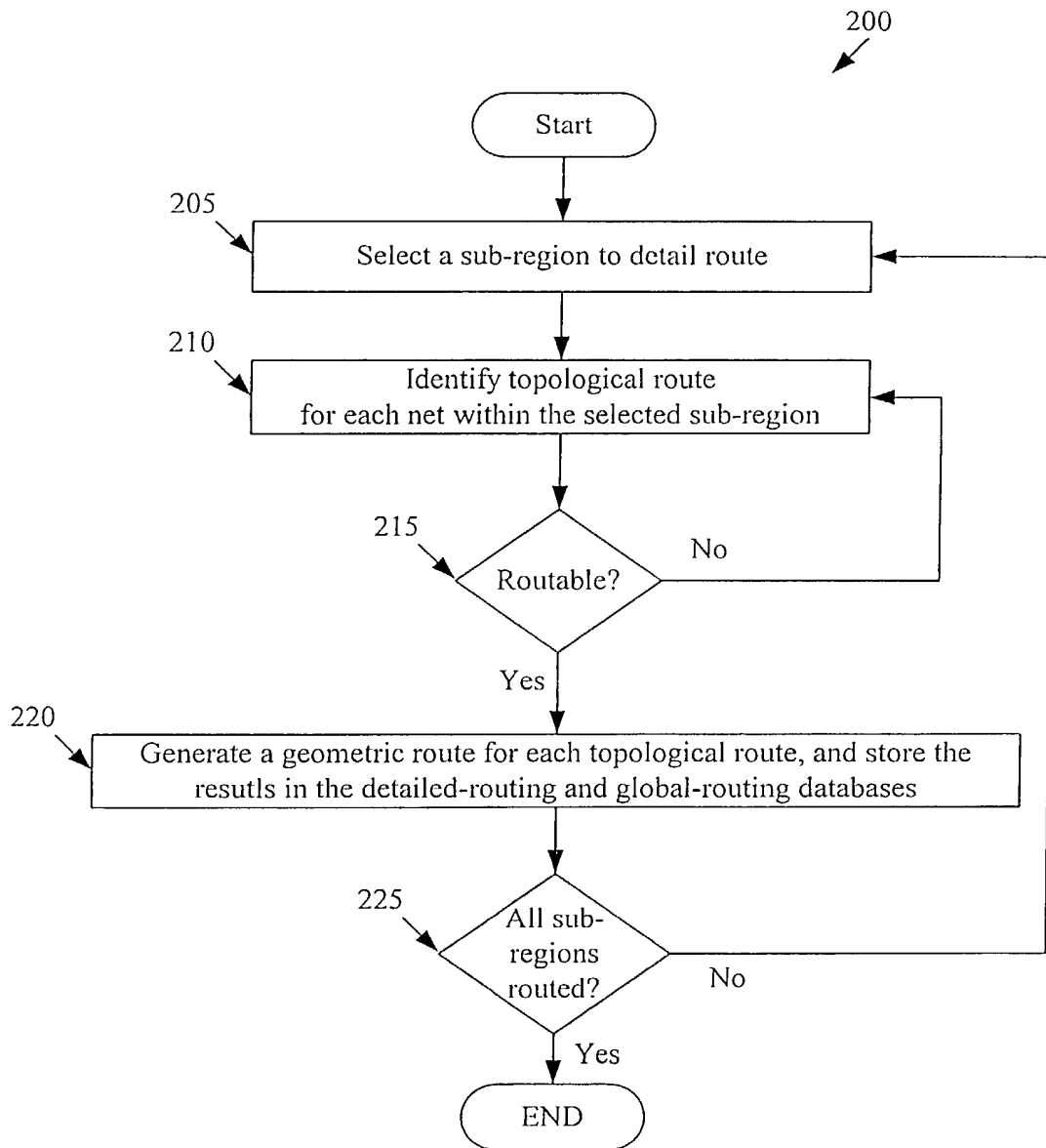


Figure 2

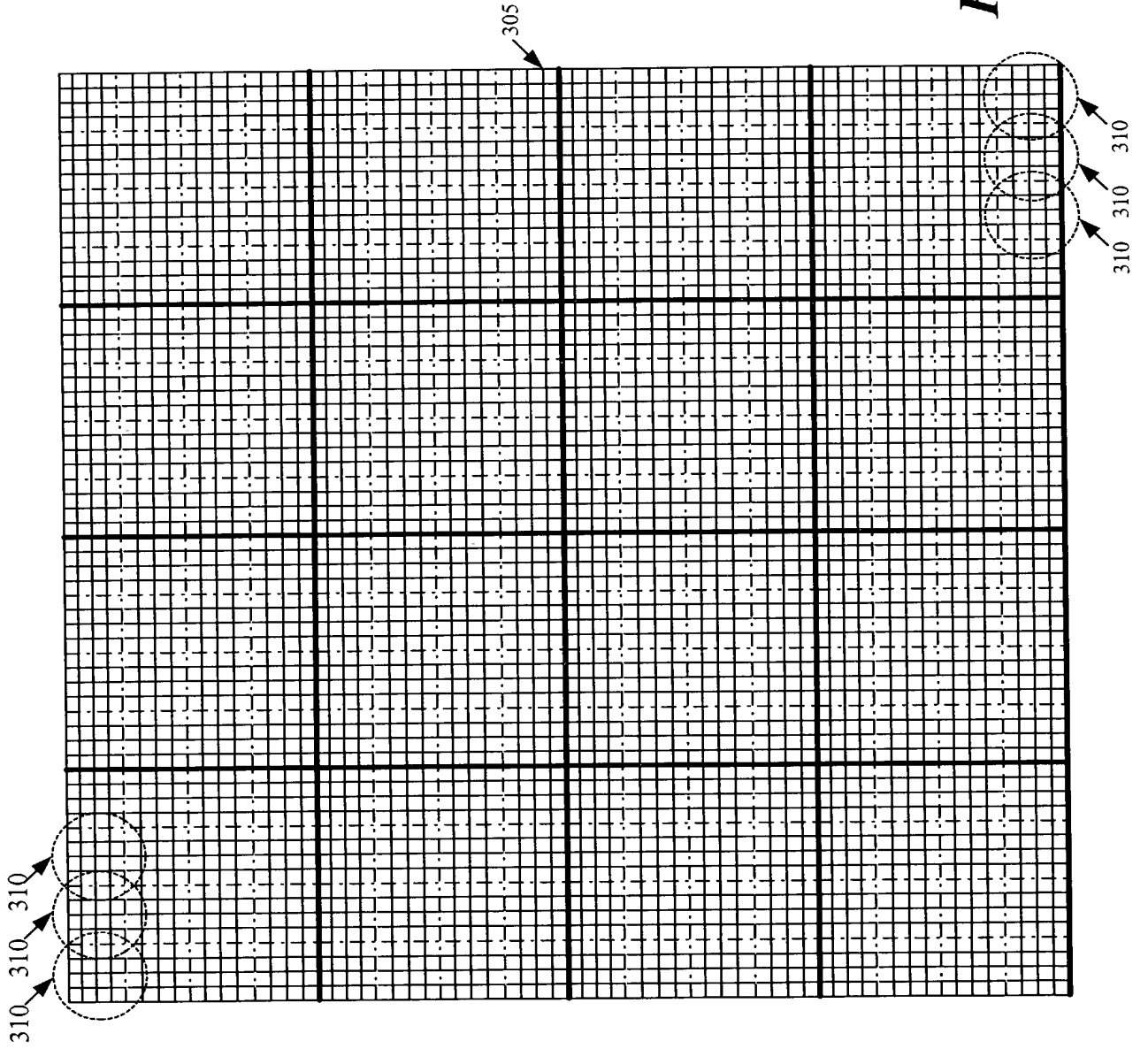


Figure 3

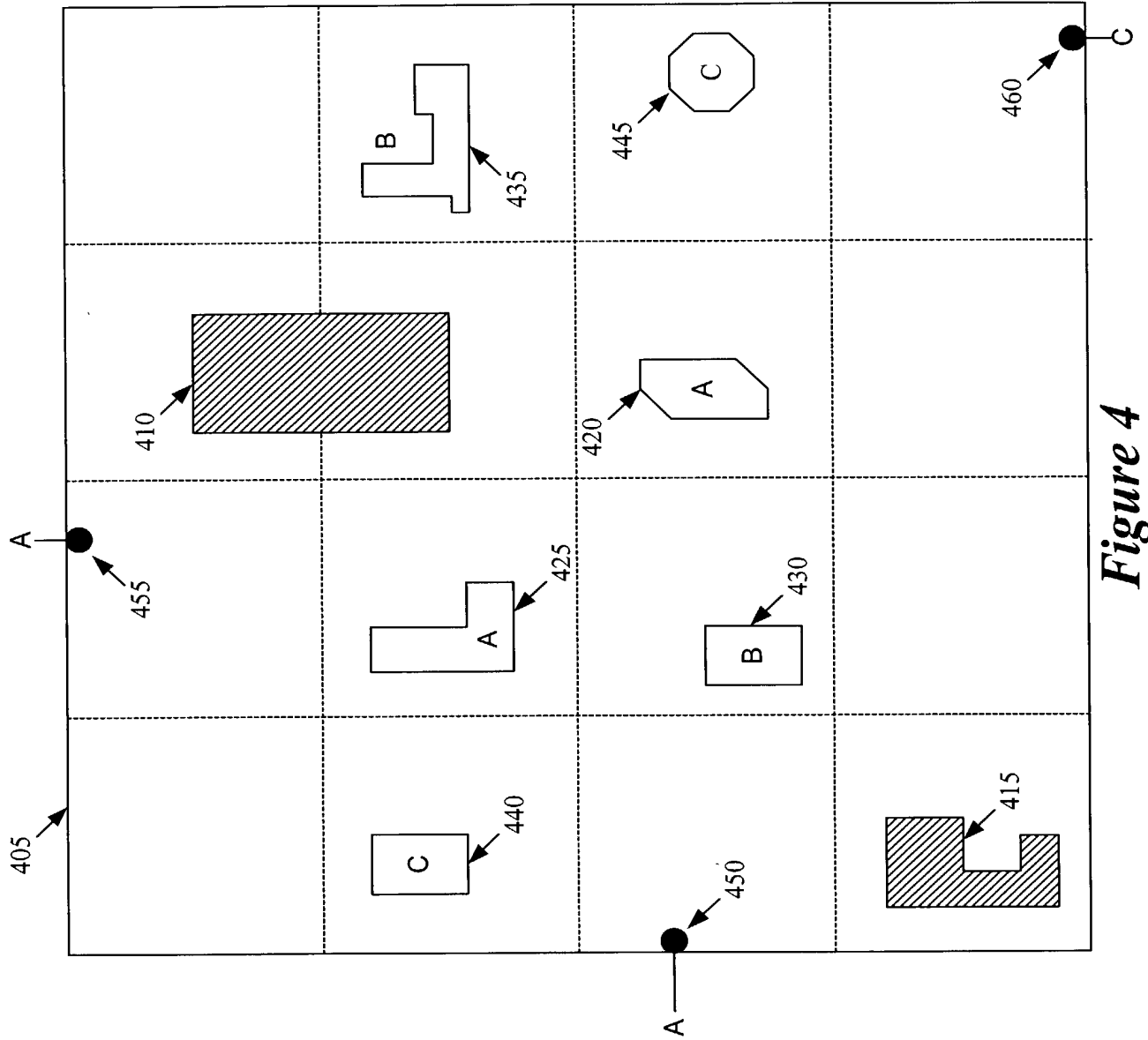


Figure 4

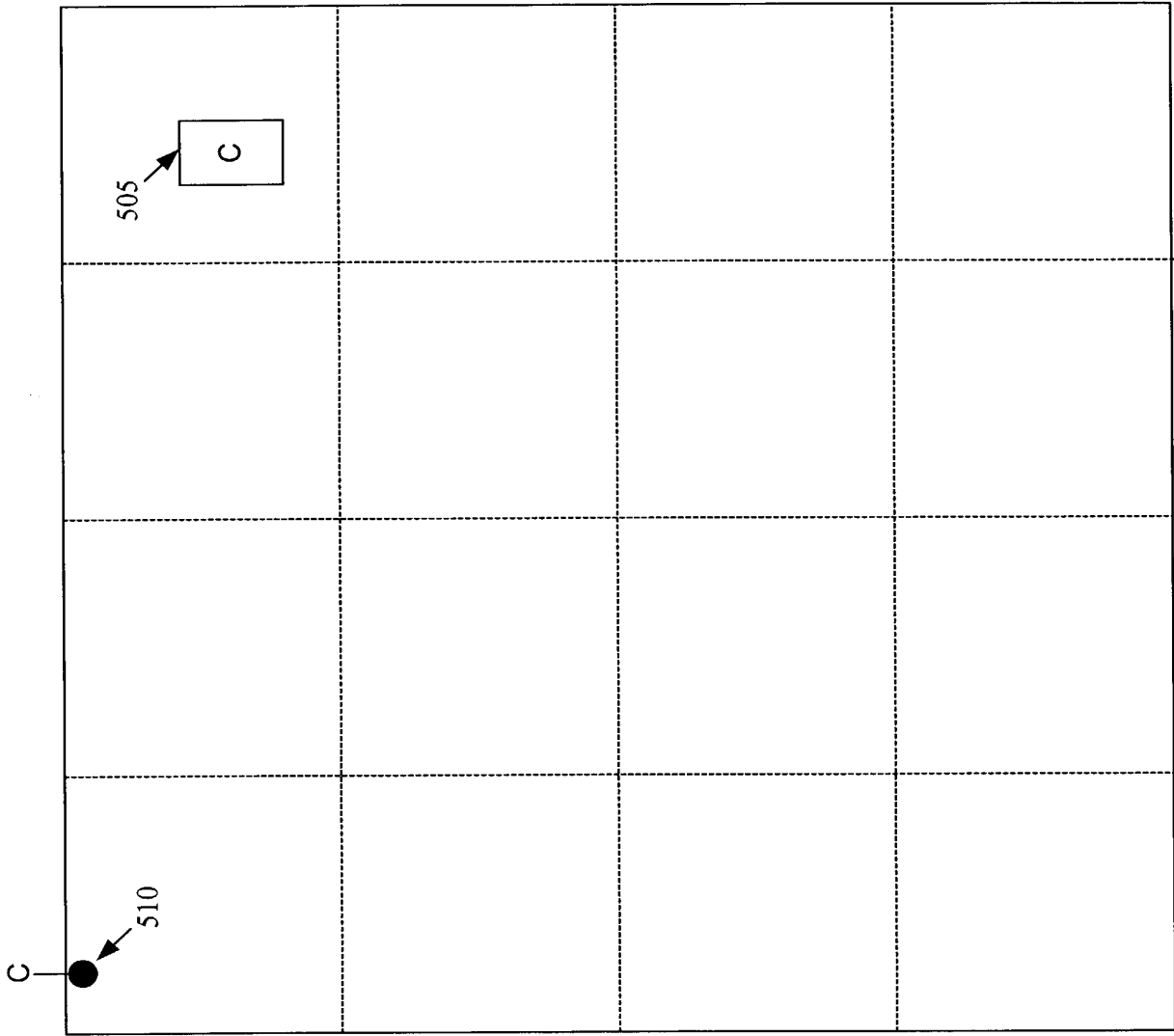


Figure 5

Figure 6

```
-List of Geometries
  --Each Geometry including a sequence of points & layer assignment
-Bounding box of the region
-Array of layer properties
  --Minimum wire size
  --Minimum spacing
  --Via sizes
  --Cost/Unit
-Netlist specifying a number of nets
  --Each net specifying a set of pins
    --Each pin specifying a set of ports
    --Each port specifying a set of geometries
```

Figure 7

```
-List of Geometries
  --Each Geometry including a sequence of points & layer assignment
    --List of connection nodes inside each pin geometry
-Bounding box of the region
-Array of layer properties
  --Minimum wire size
  --Minimum spacing
  --Via sizes
  --Cost/Unit
-Netlist specifying a number of nets
  --Each net specifying a set of pins
    --Each pin specifying a set of ports
    --Each port specifying a set of geometries
-For each layer, a graph specifying
  --Nodes
  --Edges
  --Faces
```

Face
<ul style="list-style-type: none"> -Reference to 3 edges -Reference to 3 nodes -Up to two references for up to two face item

800

Edge
<ul style="list-style-type: none"> -Two references for up to two faces of the edge -Capacity -Flow -Constrained -Linked list of items on the edge starting with one of the edge's nodes and ending with its other node

900

Figure 8

Figure 9

Node
<ul style="list-style-type: none"> -Net Identifier -One or more planar-path references to adjacent topological items in the same planar path -A pair of via-path references to up and down topological via items -A references to list of edges connected to the node -For each edge, an edge reference to the next or previous topological item on the edge -A reference to the geometry of the node -Vertex number identifying the vertex of the geometry -Location of the node

1000

Figure 10

Edge Item
<ul style="list-style-type: none"> -Reference to its edge -Net Identifier -A pair of planar-path references to adjacent topological items in the same planar path -A pair of edge references to the next and previous topological item on the edge

1100

Face Item
<ul style="list-style-type: none"> -Reference to its face -Net Identifier -Up to 3 planar-path references for adjacent topological items in the same planar path -A pair of via-path references for up and down topological via items -Bounding polygon that defines legal face item locations -Constraining Points and Distances

1200

Figure 11

Figure 12

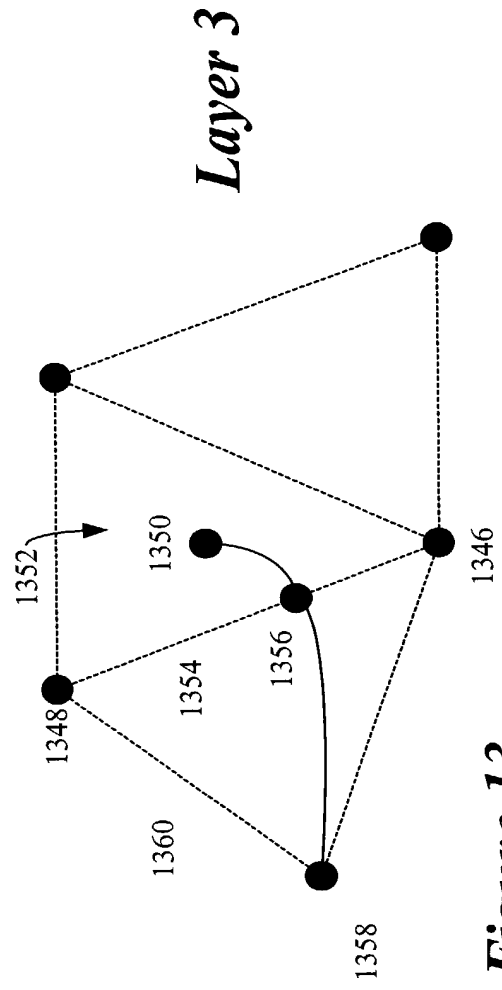
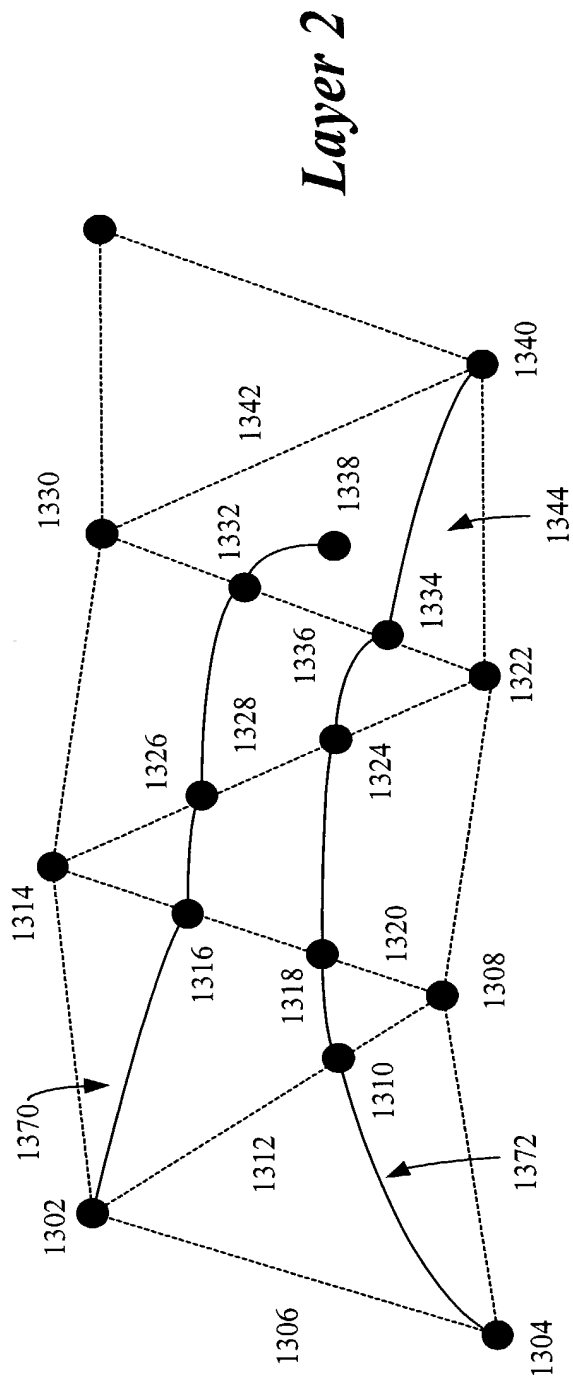
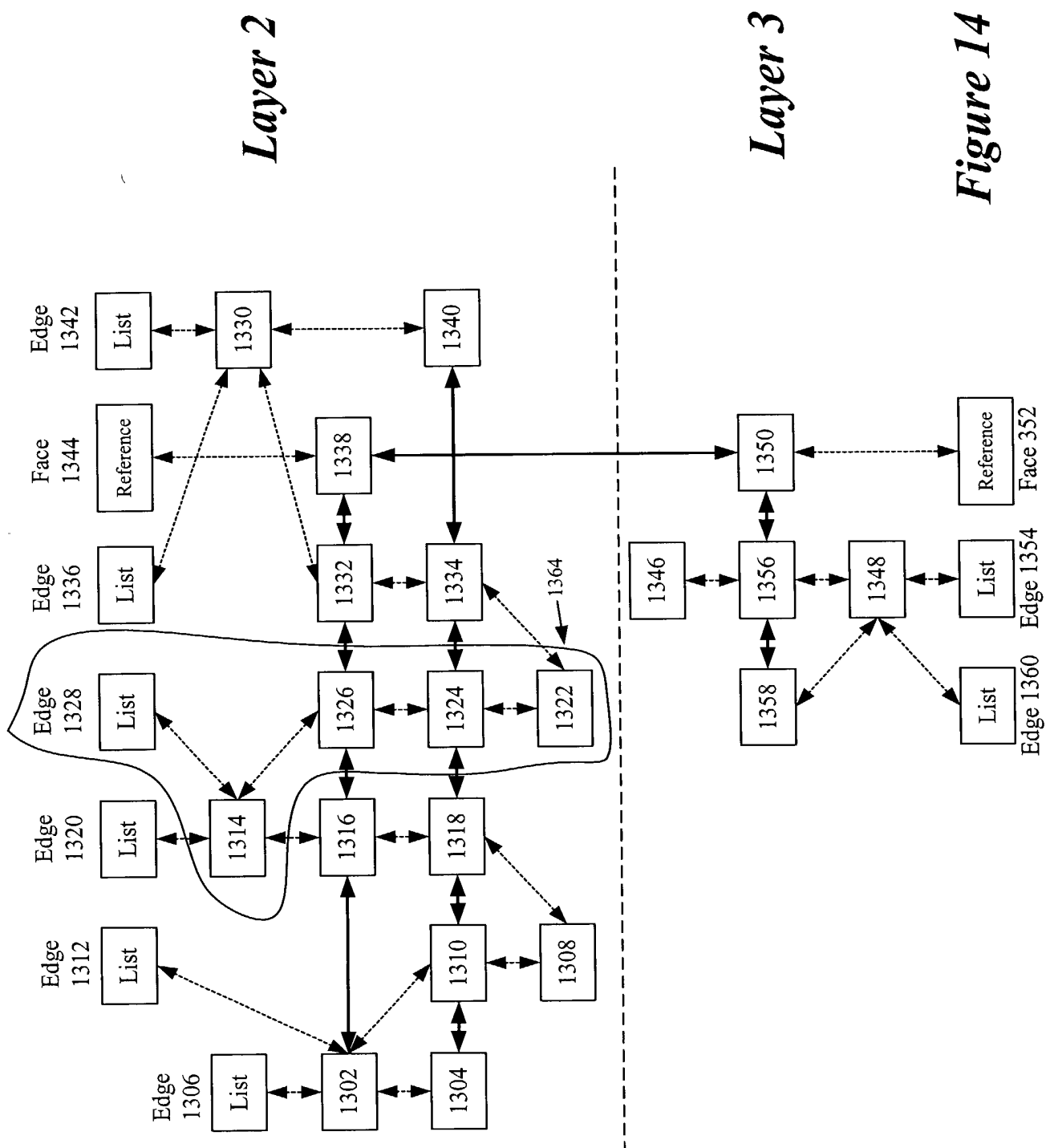


Figure 13



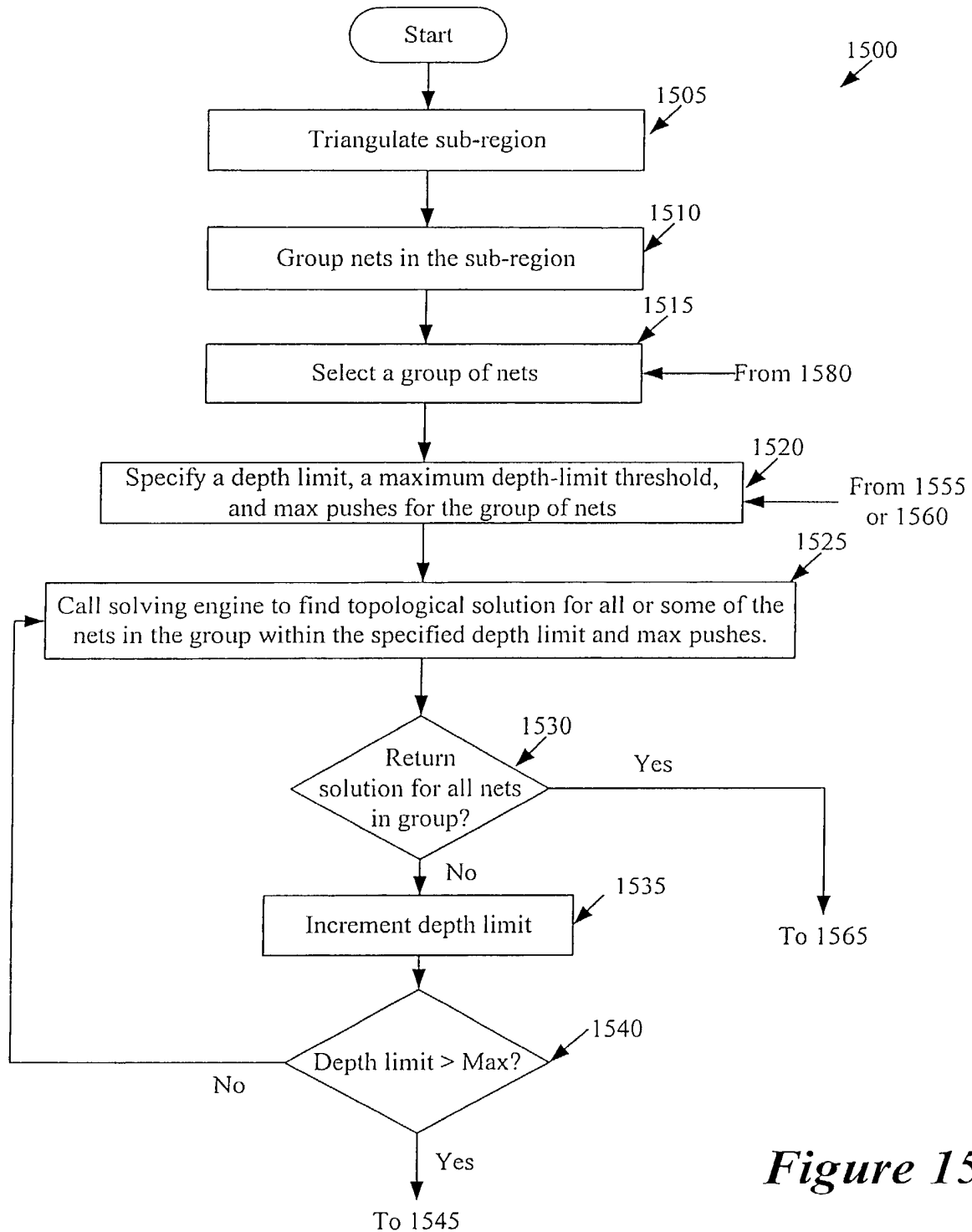
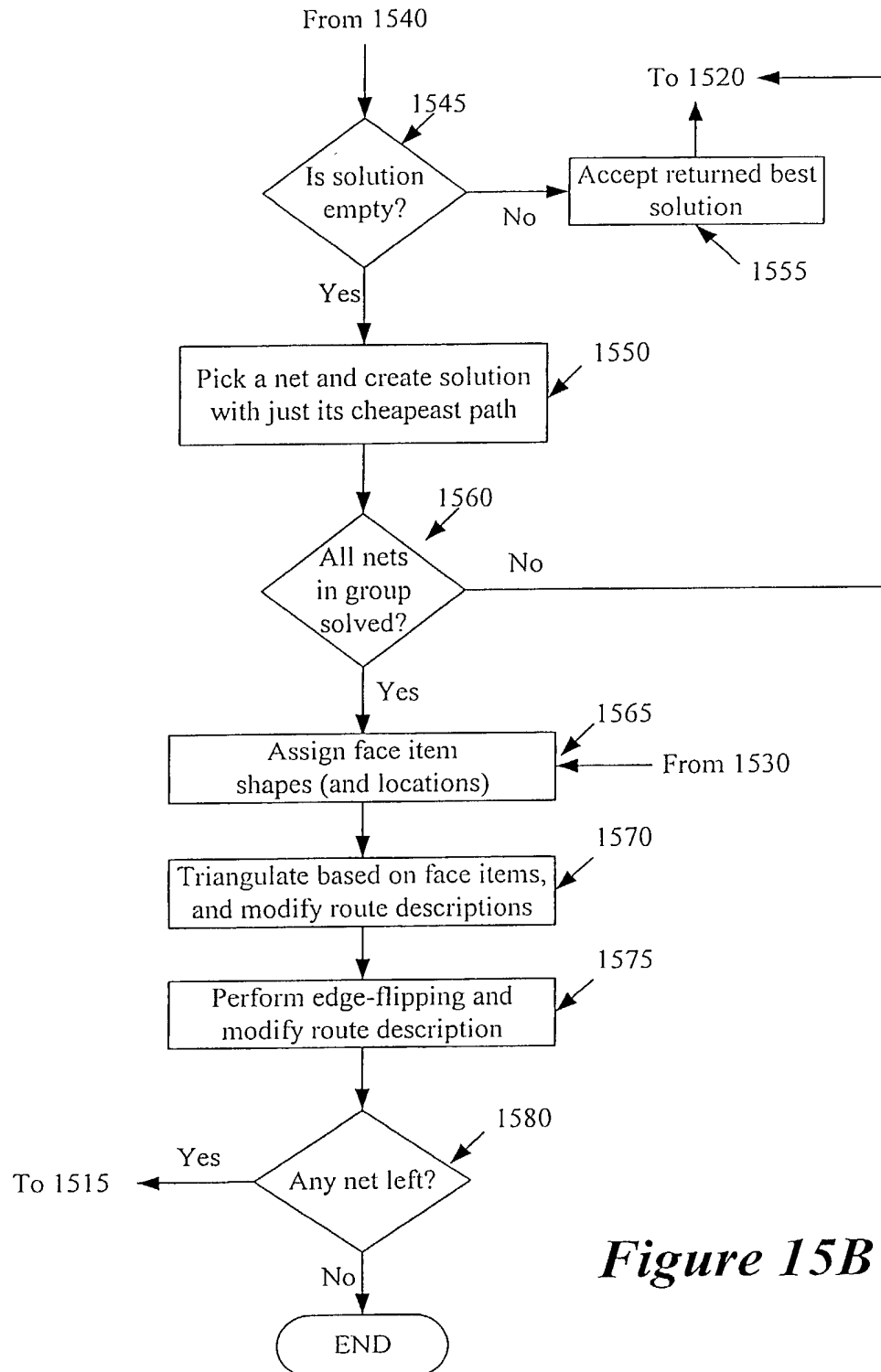
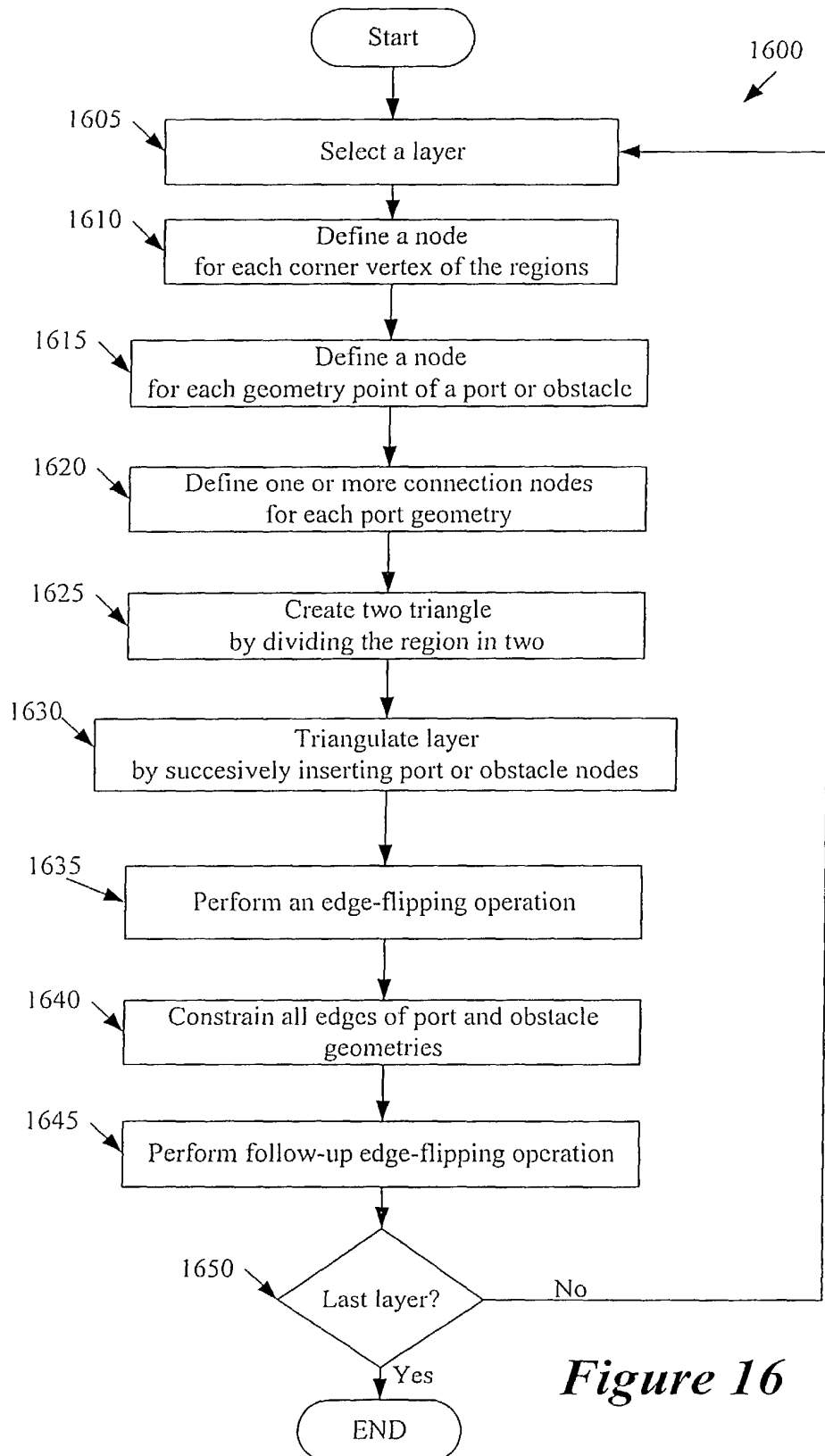


Figure 15A

Figure 15: *Figure 15A*
Figure 15B

*Figure 15B*

*Figure 16*

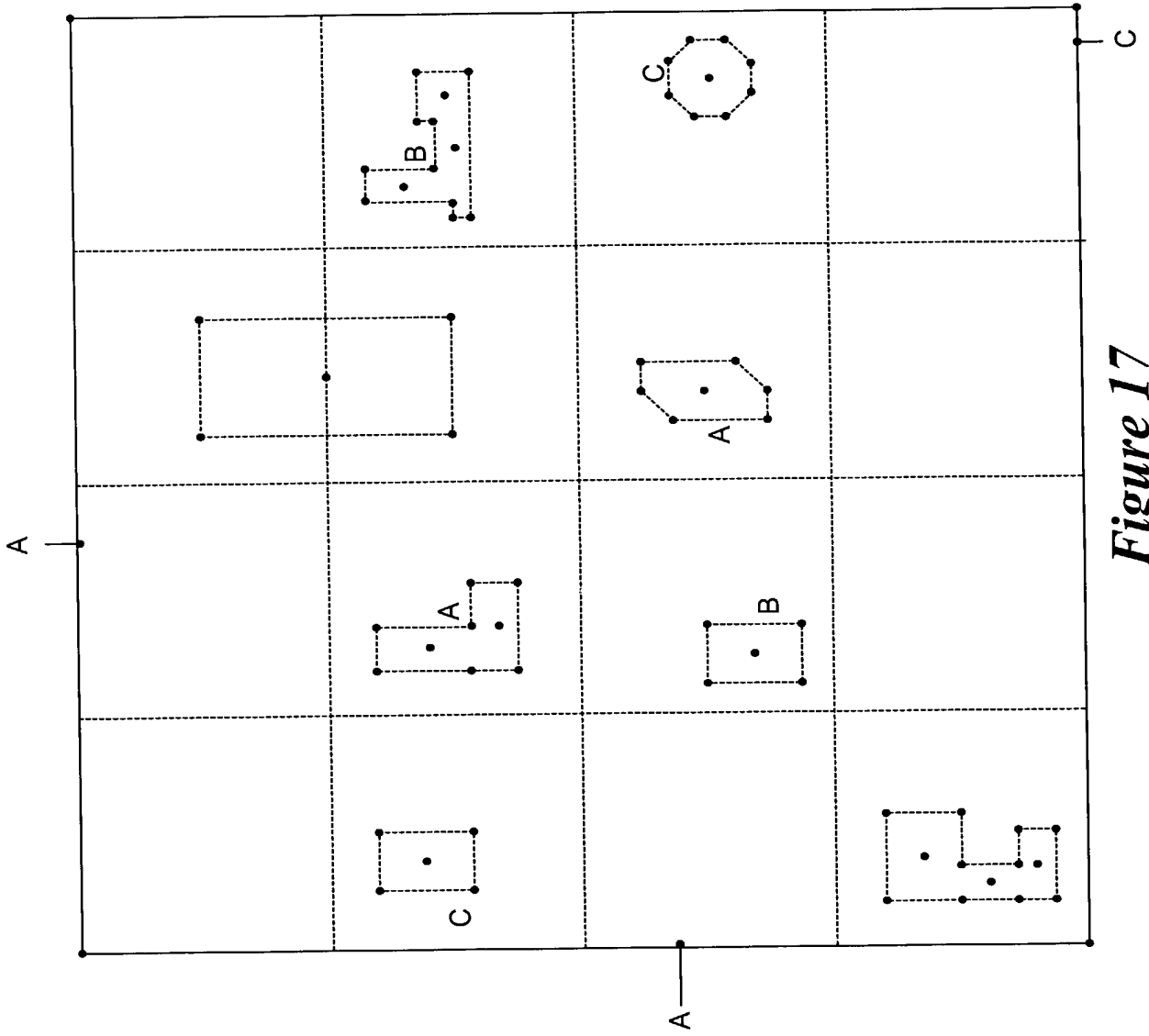


Figure 17

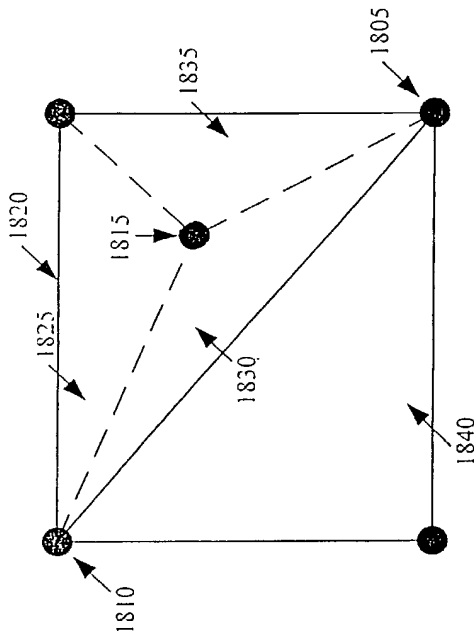


Figure 18

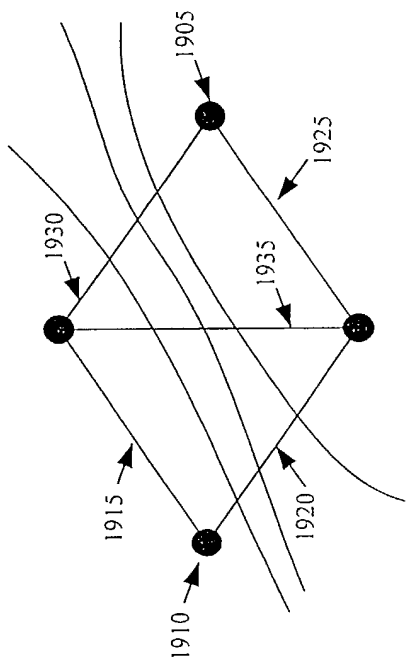


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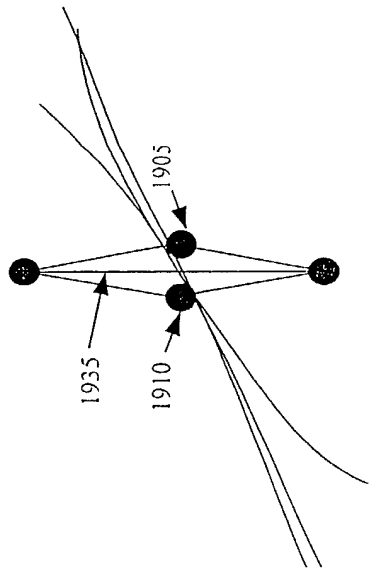


Figure 20

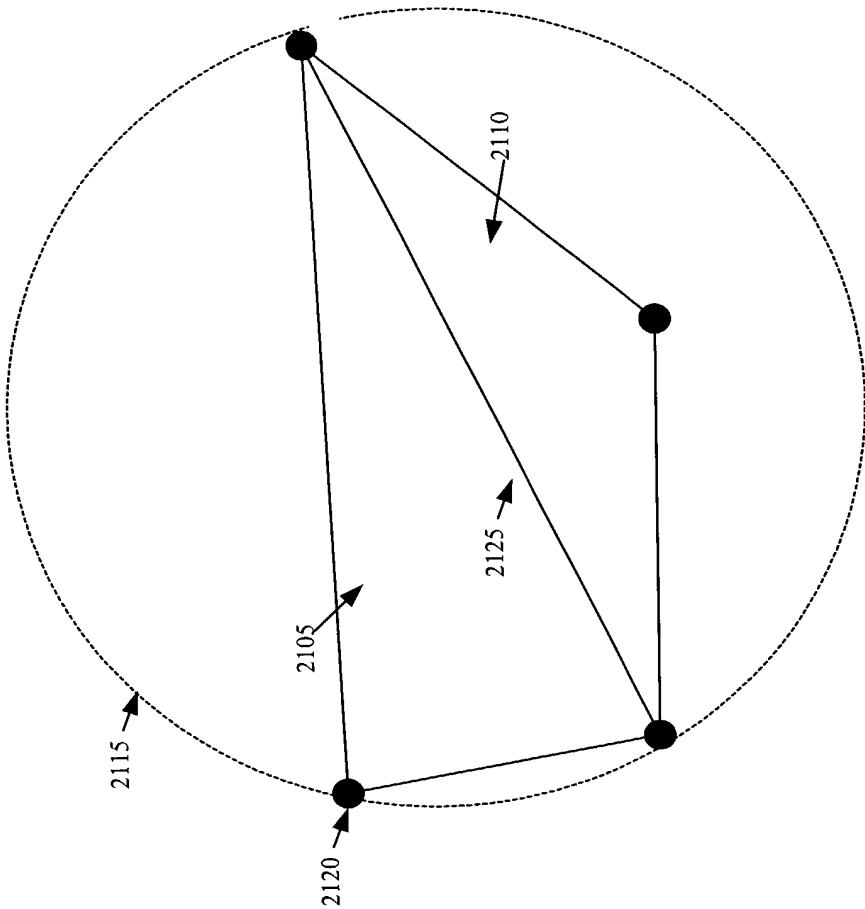


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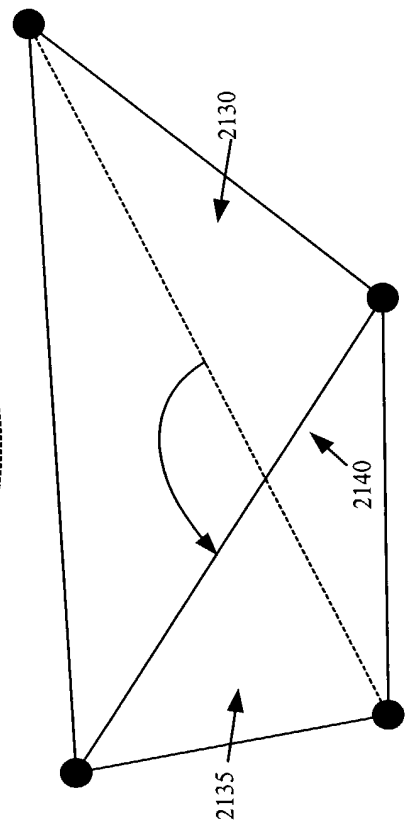


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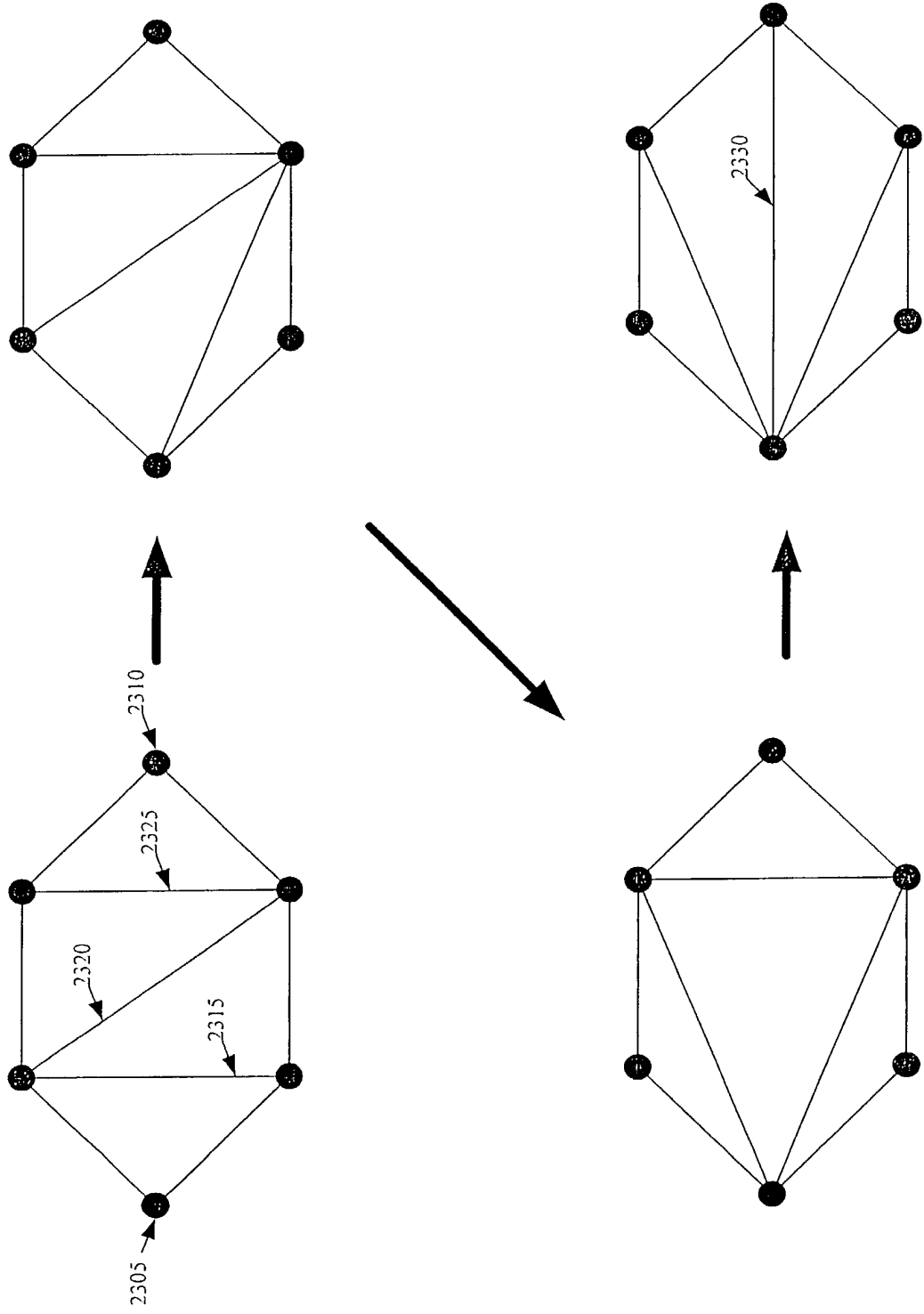


Figure 23

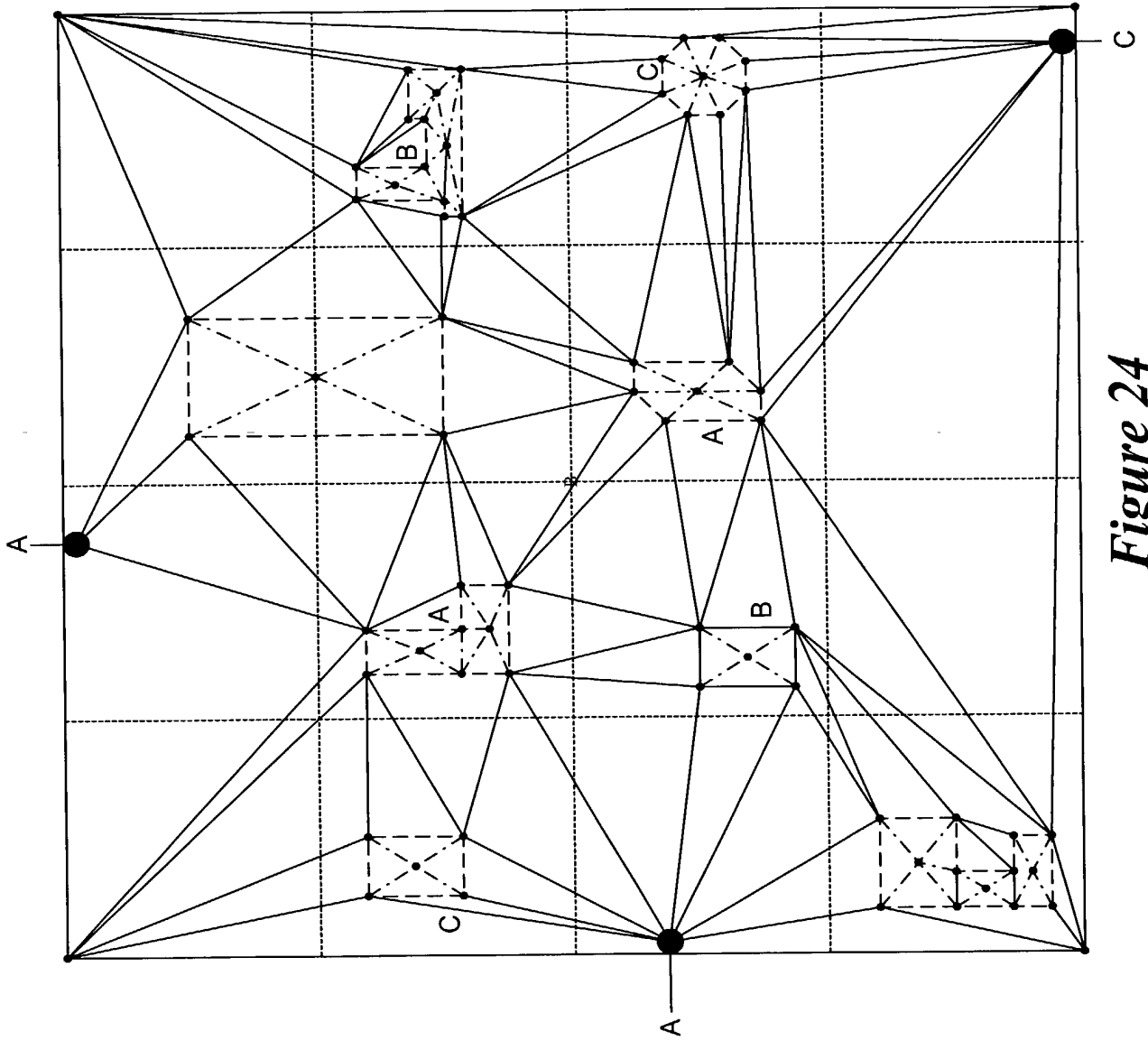


Figure 24

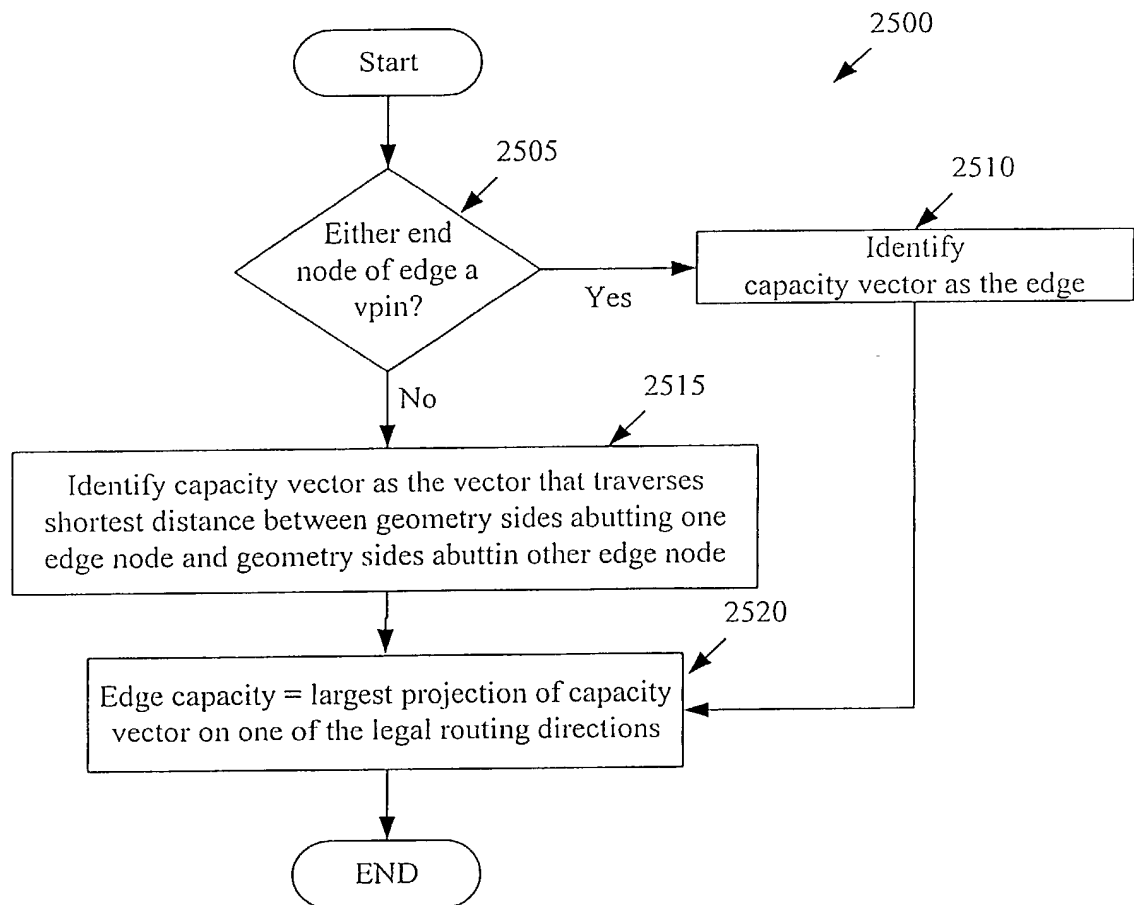


Figure 25

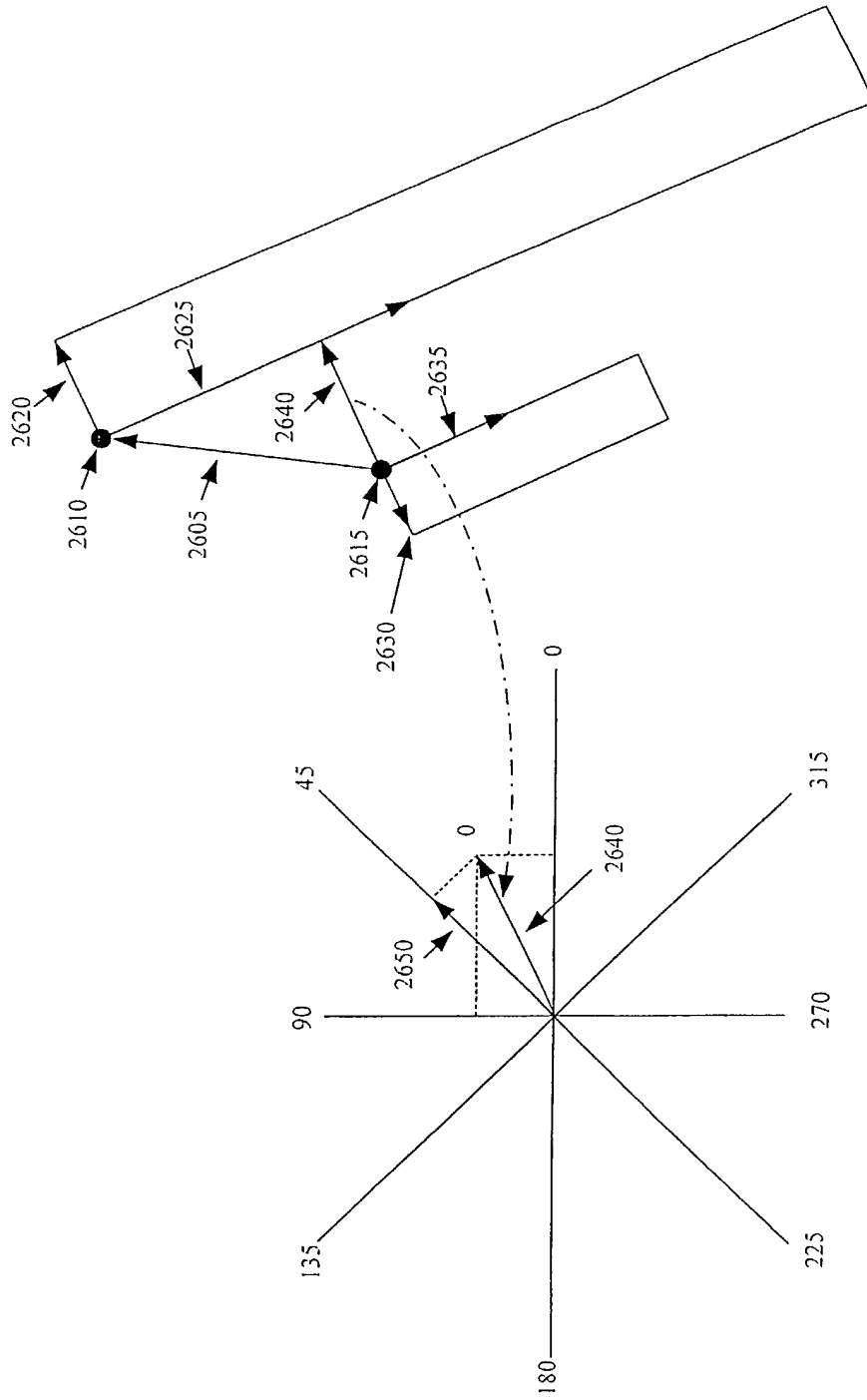


Figure 26

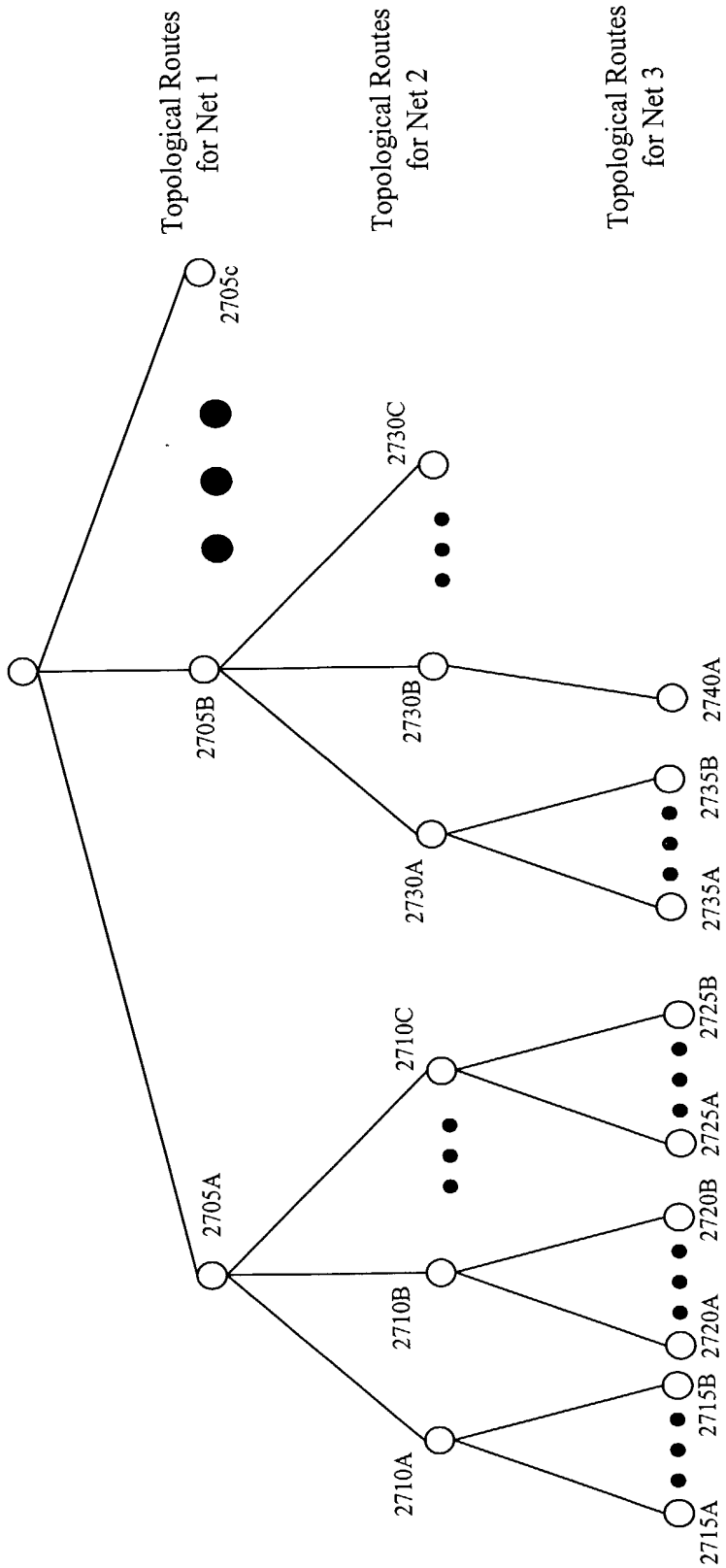


Figure 27

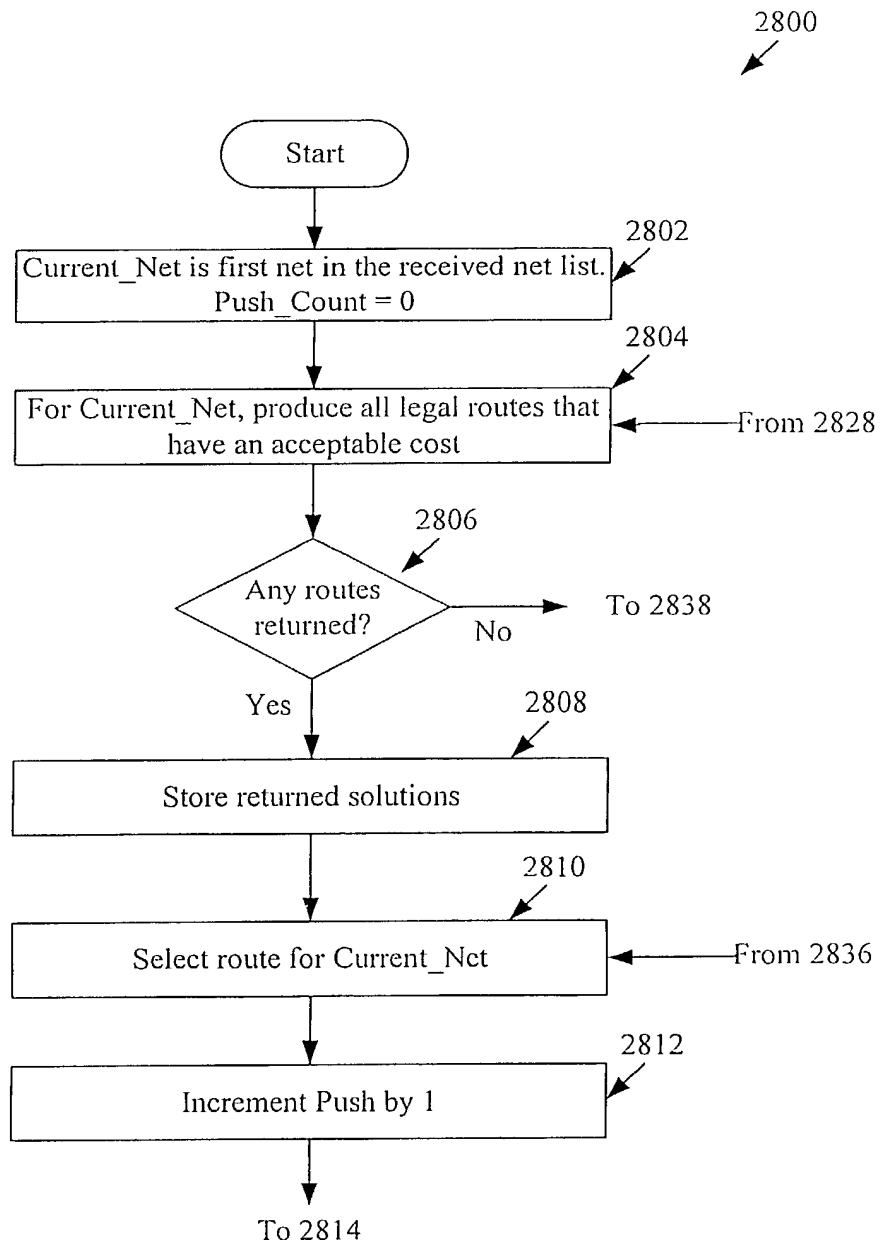
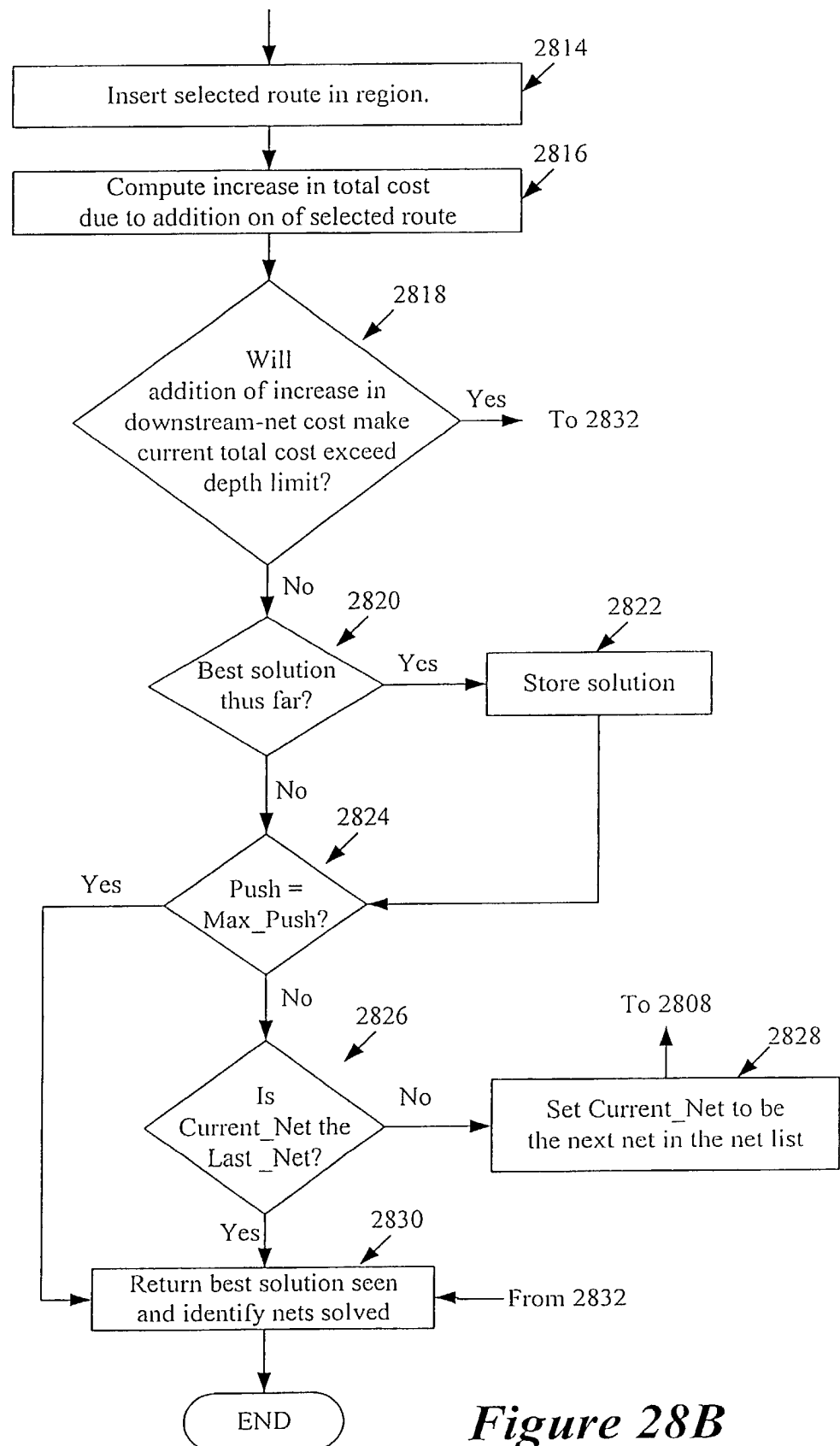
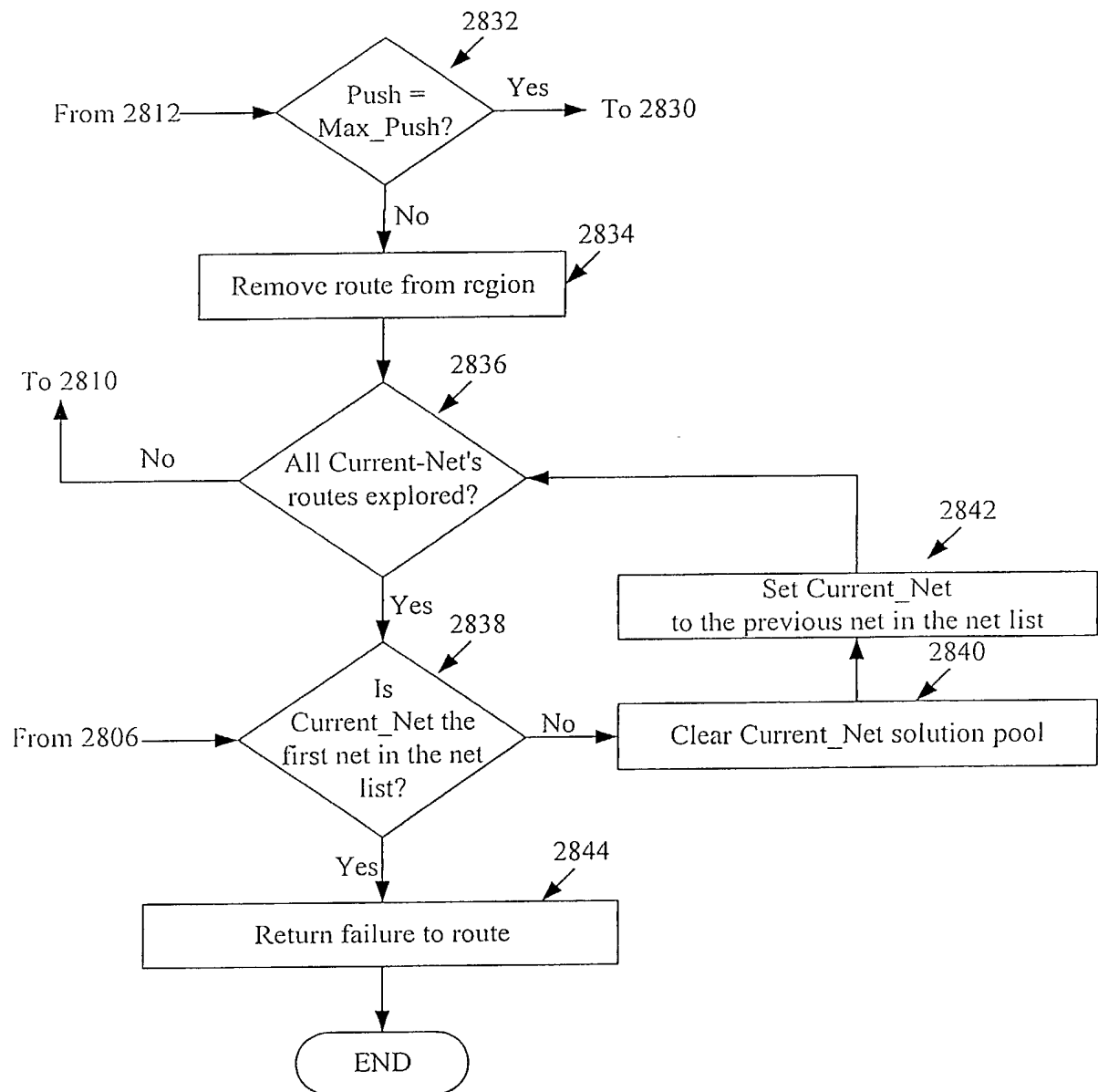


Figure 28A

Figure 28: $\frac{\text{Figure 28A}}{\frac{\text{Figure 28B}}{\text{Figure 28C}}}$

*Figure 28B*

*Figure 28C*

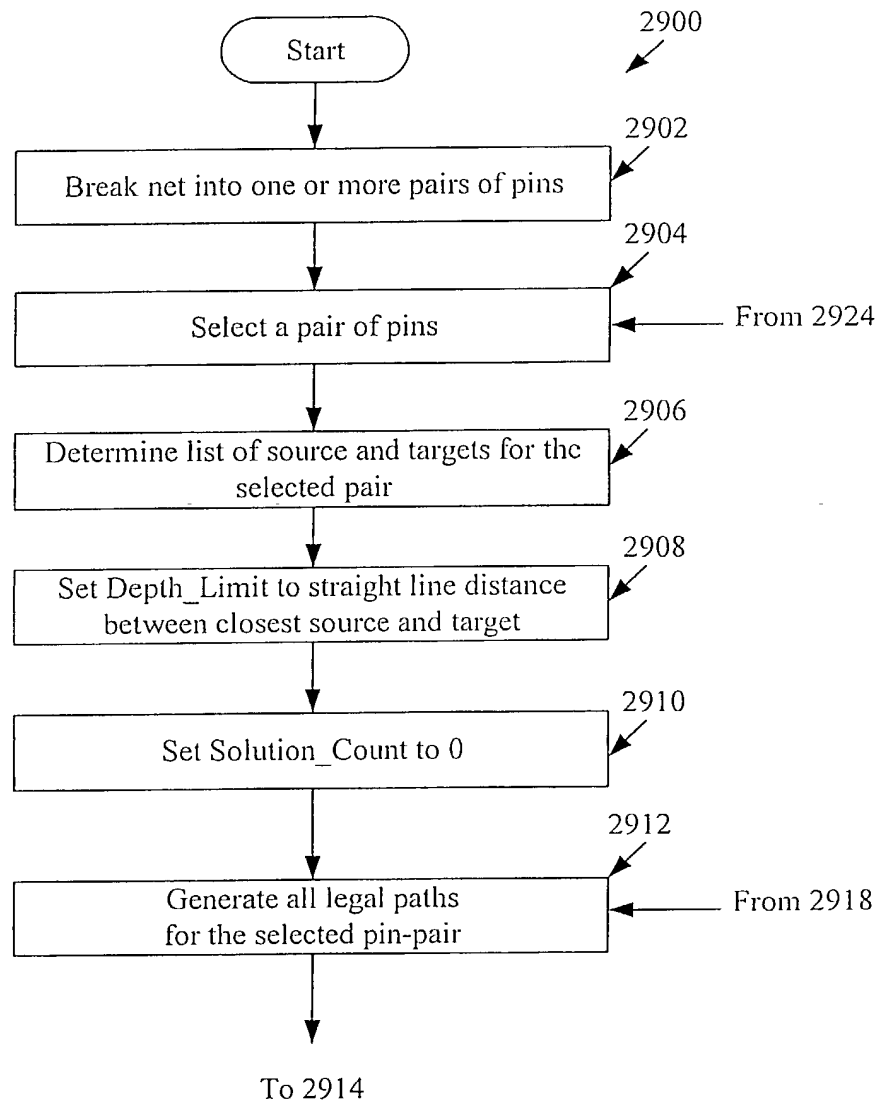
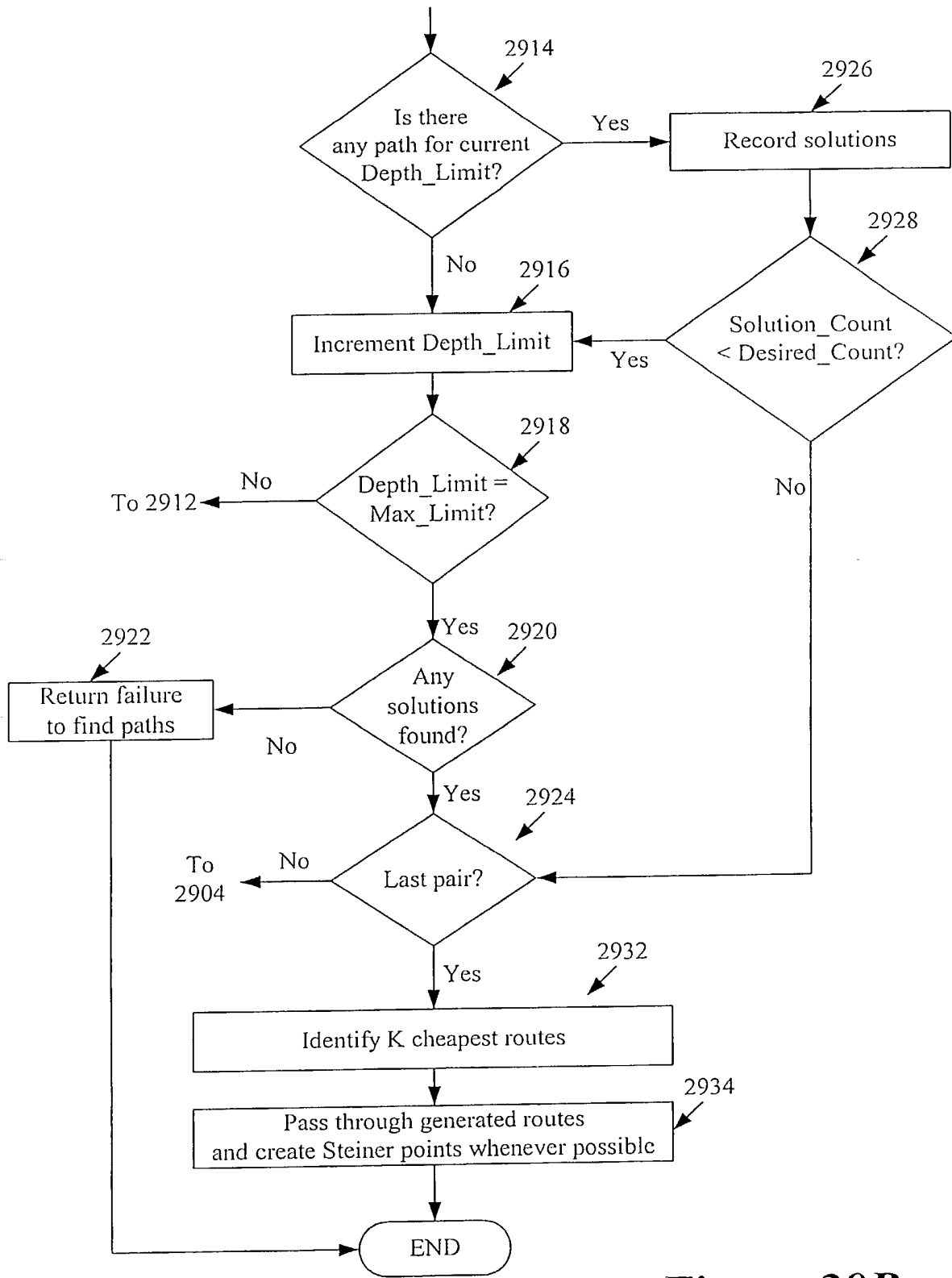


Figure 29A

Figure 29: $\frac{\text{Figure 29A}}{\text{Figure 29B}}$

*Figure 29B*

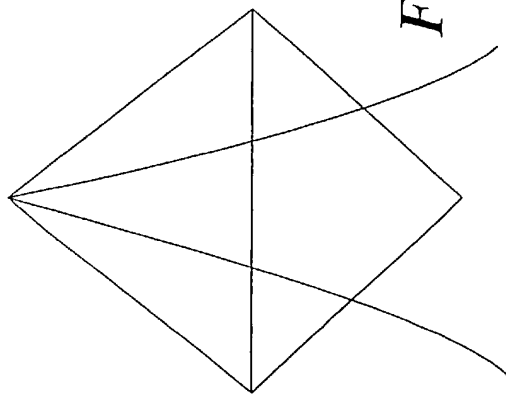


Figure 30A

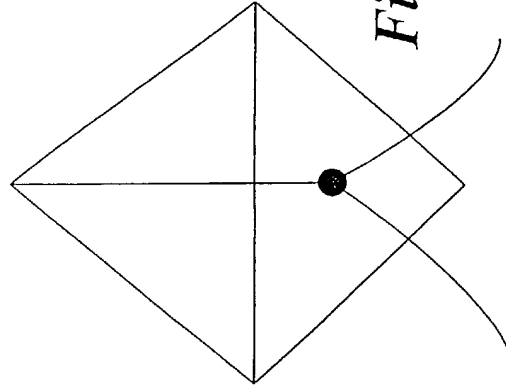


Figure 30B

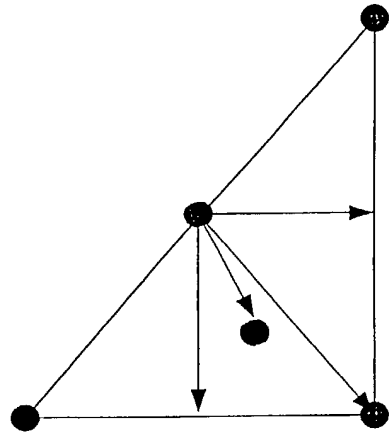


Figure 32

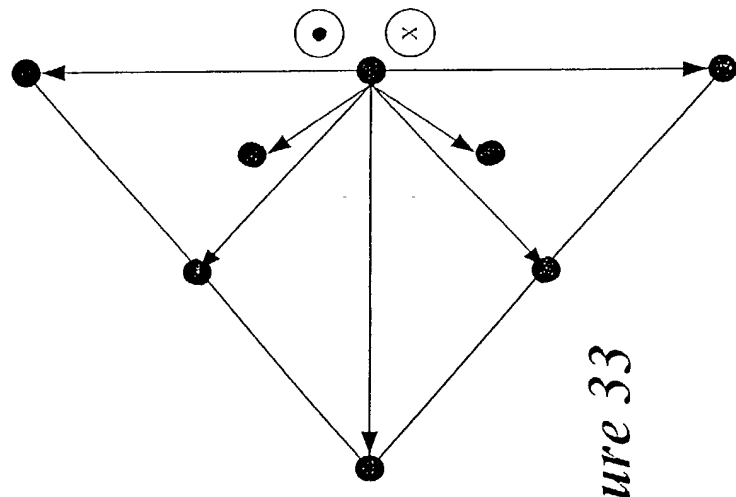


Figure 33

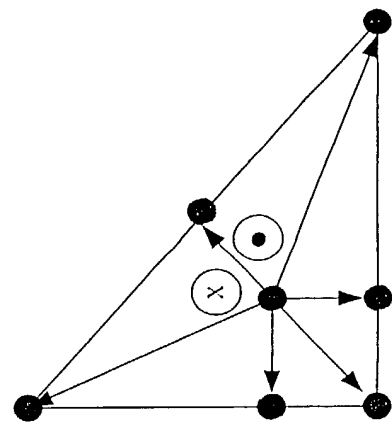


Figure 34

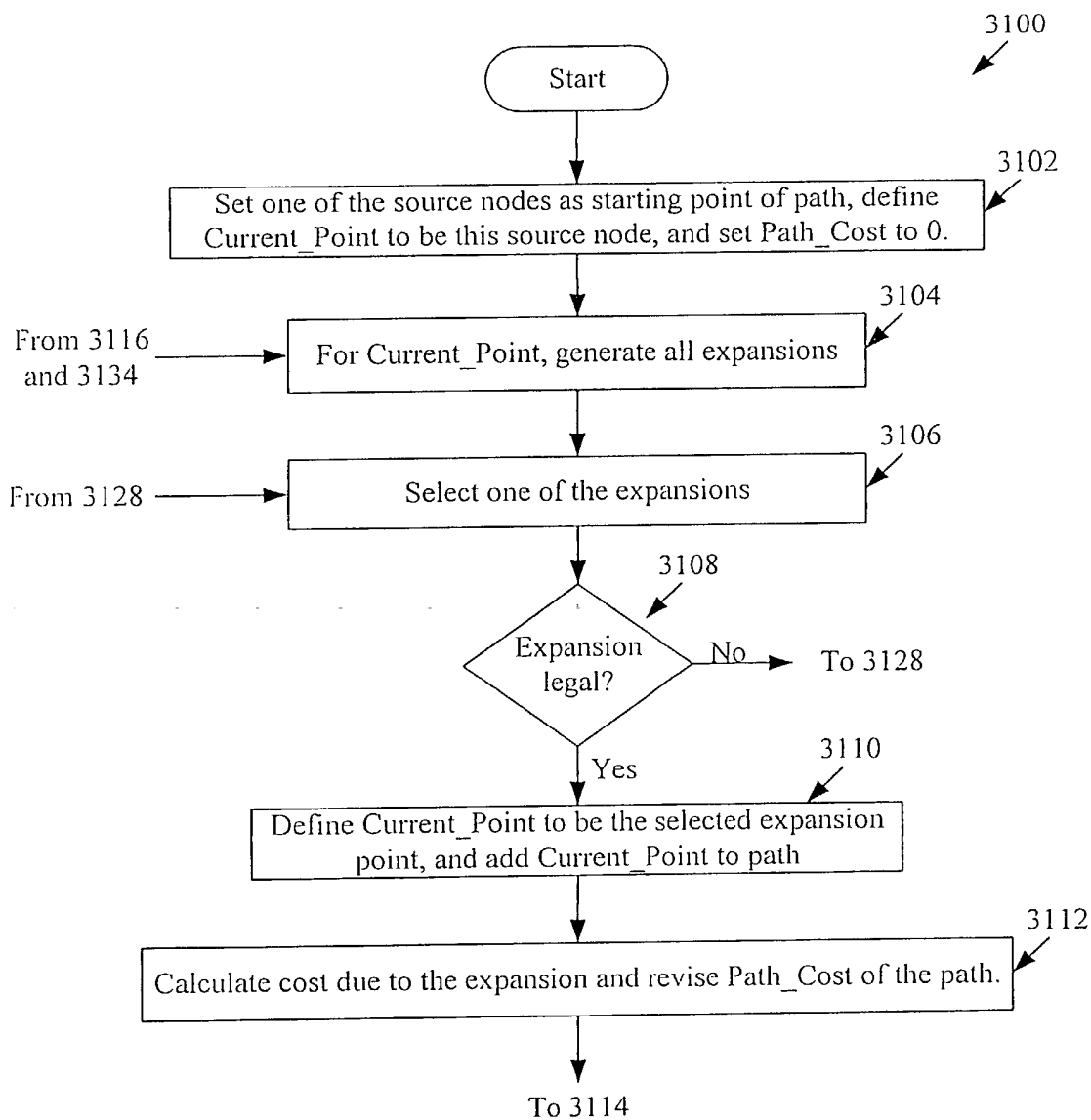


Figure 31A

Figure 31: $\frac{\text{Figure 31A}}{\text{Figure 31B}}$

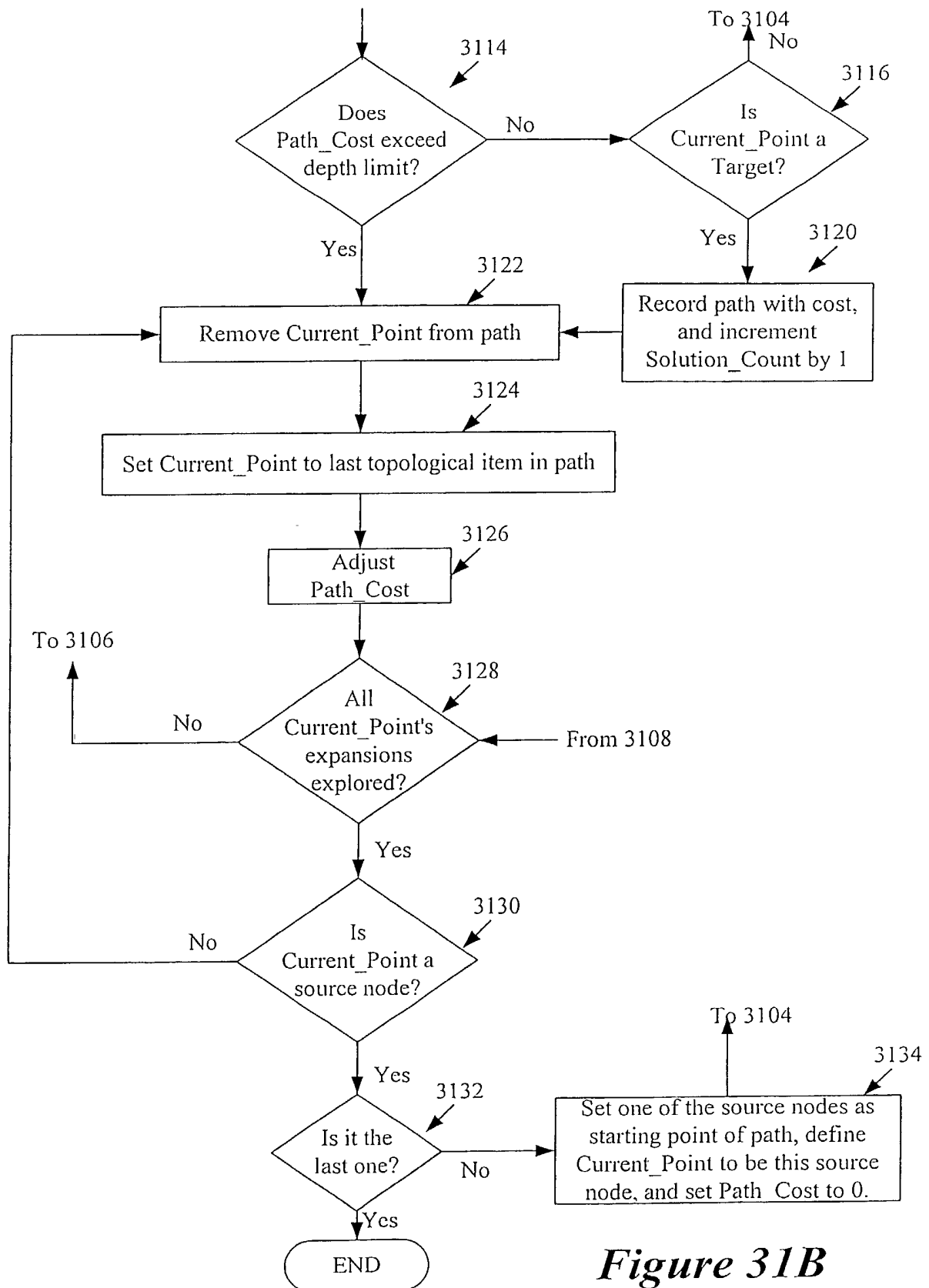


Figure 31B

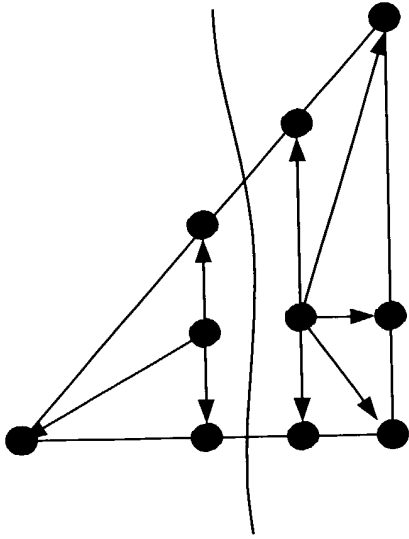


Figure 35

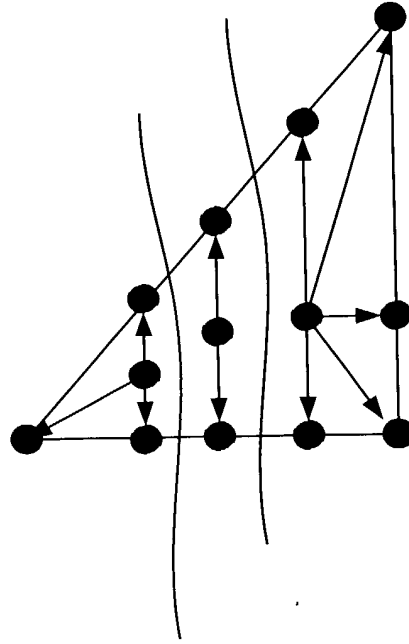


Figure 36

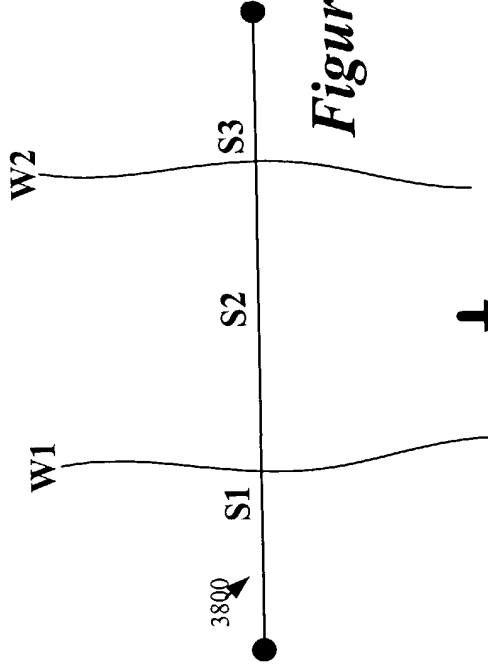


Figure 38A

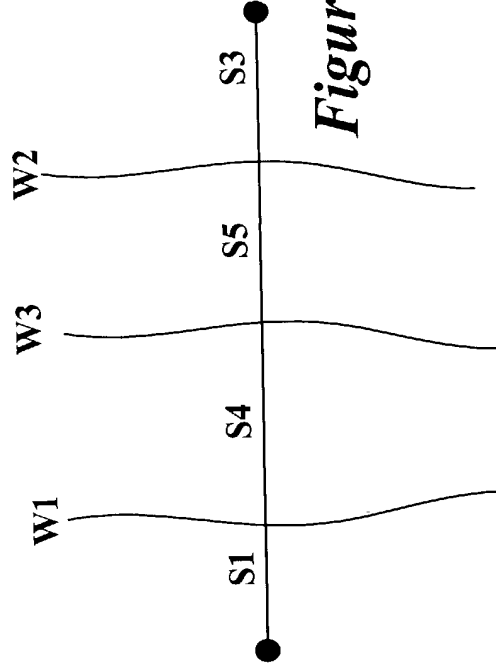
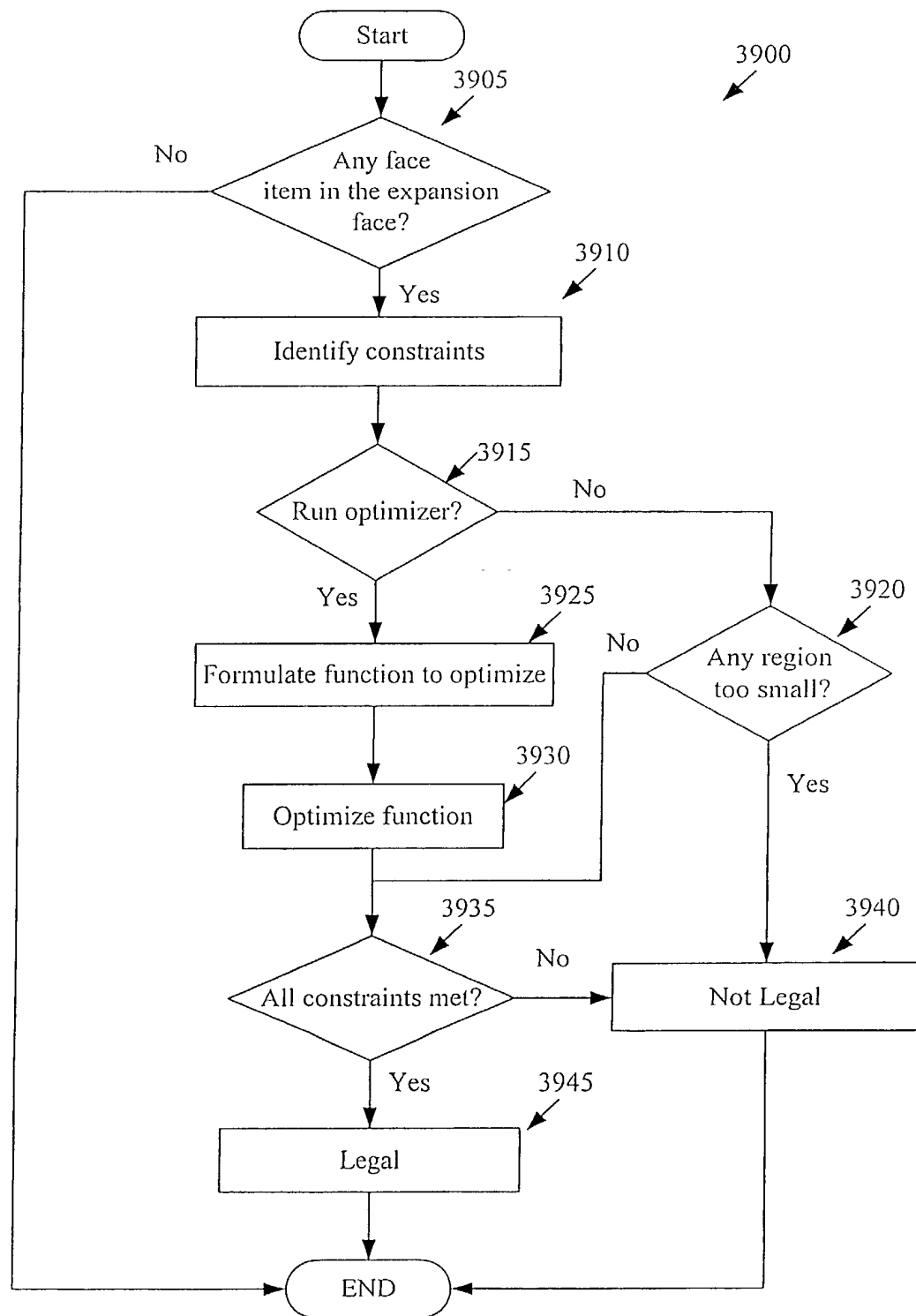


Figure 38B

To:		Node	Face Item	Edge Item
From:	Node	<ul style="list-style-type: none">• Planarity• Vias	<ul style="list-style-type: none">• Vias	<ul style="list-style-type: none">• Planarity• Vias• Edge• Capacity
	Face Item	<ul style="list-style-type: none">• Vias	<ul style="list-style-type: none">• Vias	<ul style="list-style-type: none">• Vias• Edge• Capacity
	Edge Item	<ul style="list-style-type: none">• Planarity• Vias	<ul style="list-style-type: none">• Vias	<ul style="list-style-type: none">• Planarity• Vias• Edge• Capacity

Figure 37

*Figure 39A*

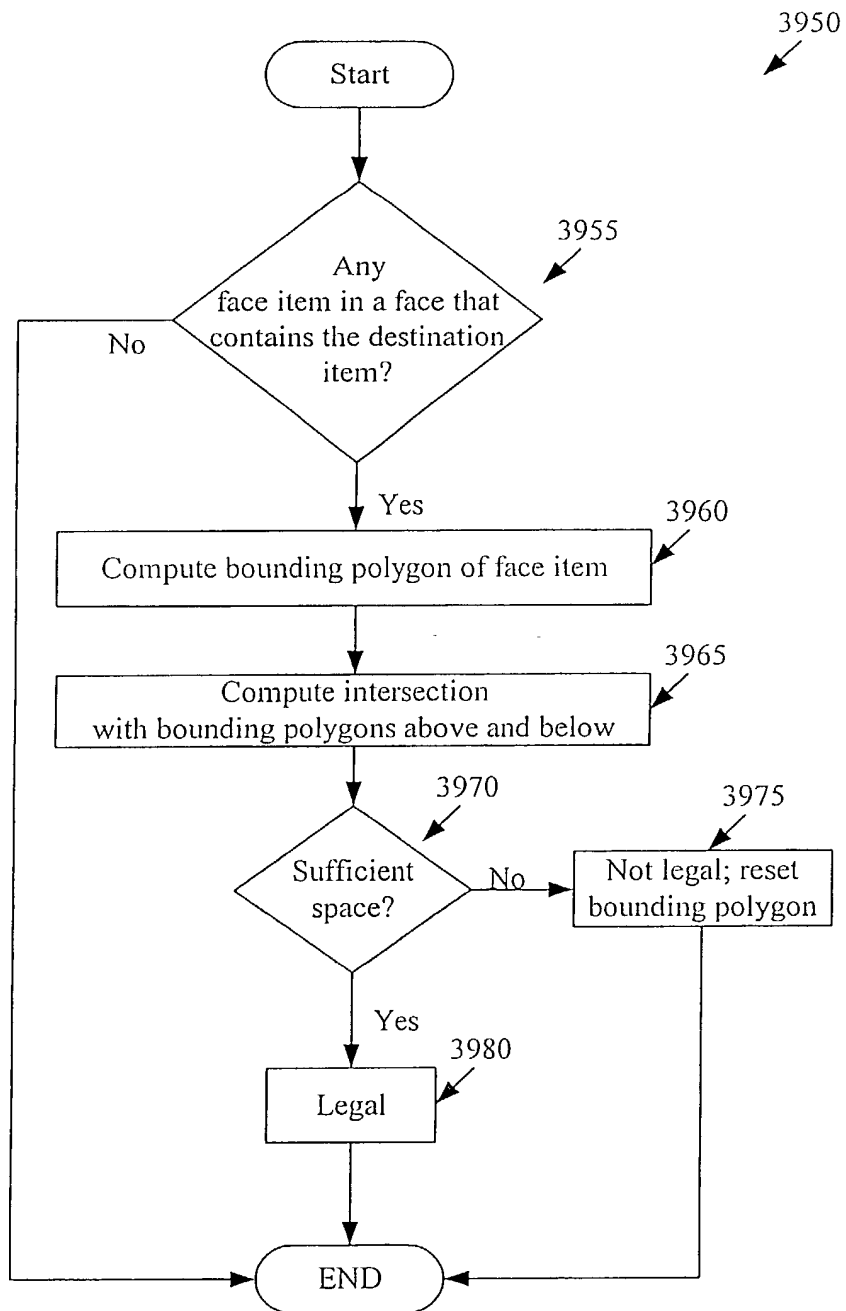
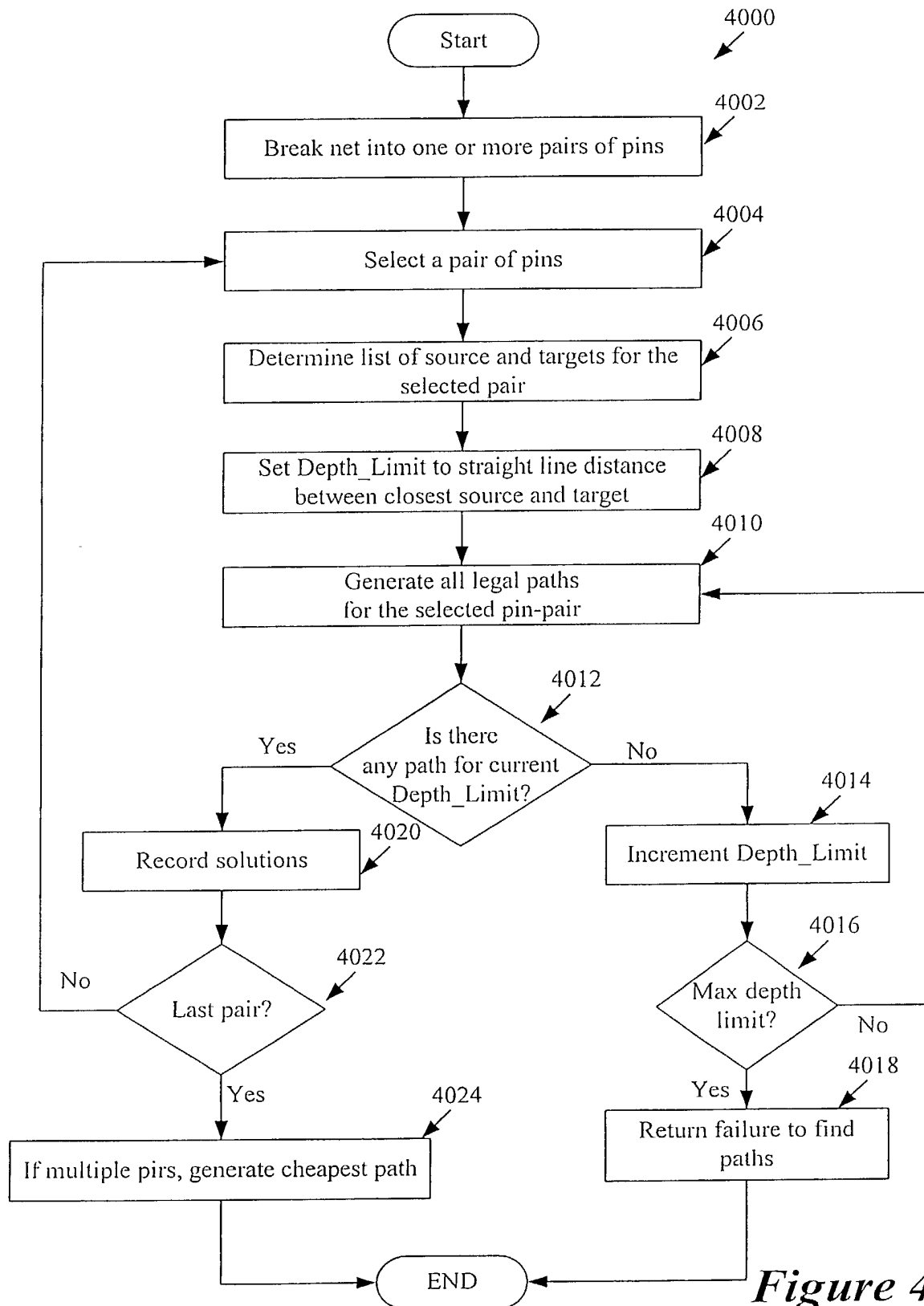


Figure 39B

*Figure 40*

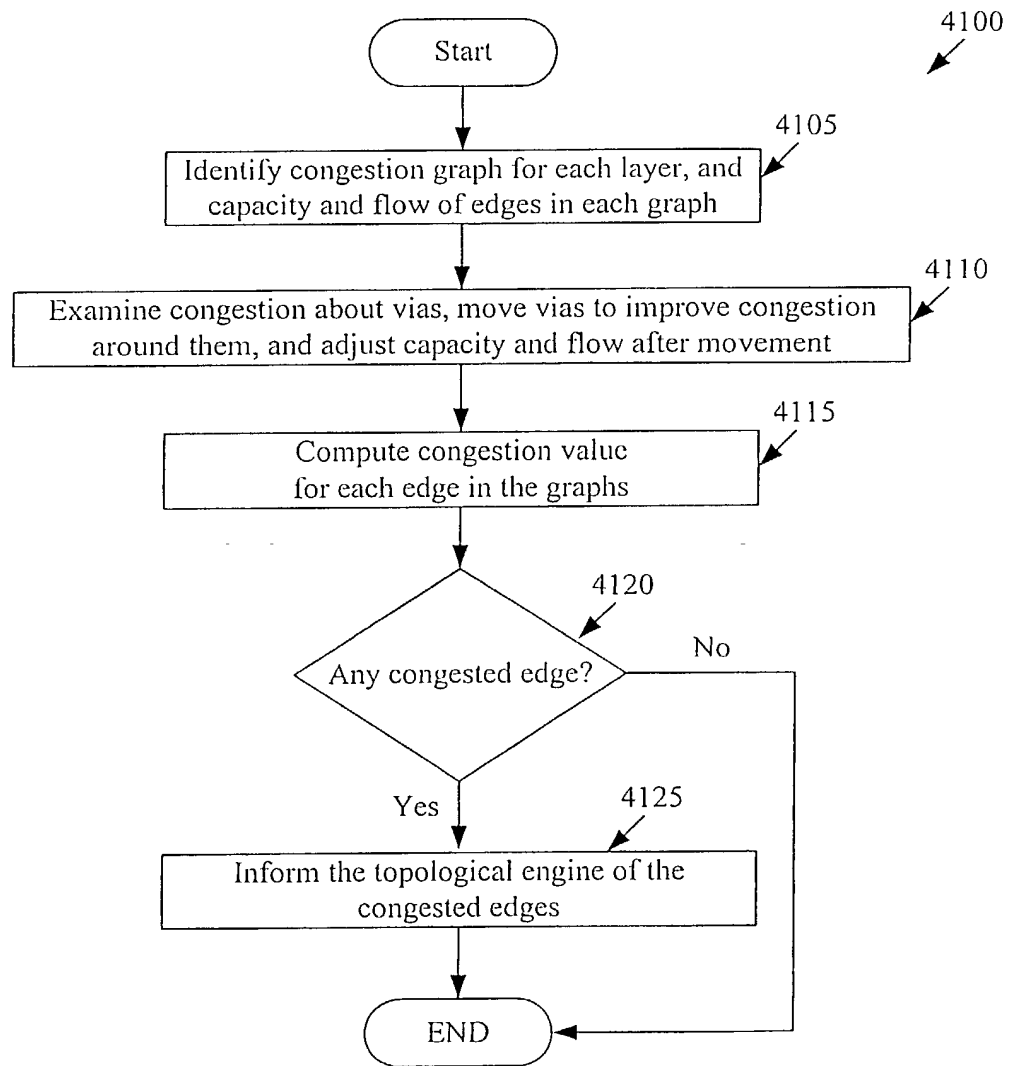


Figure 41

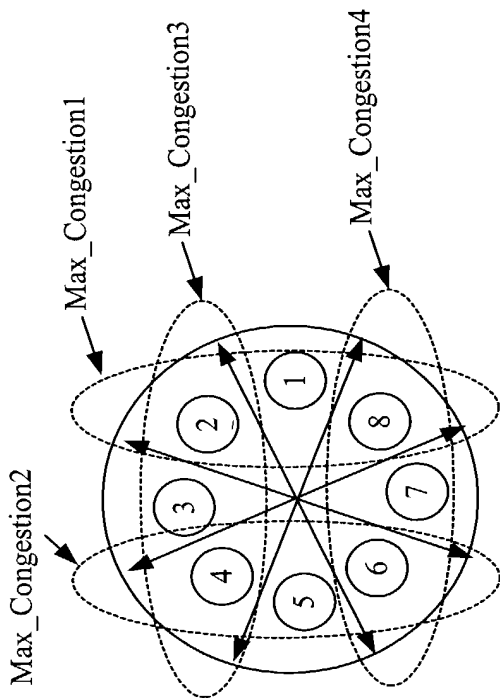


Figure 44

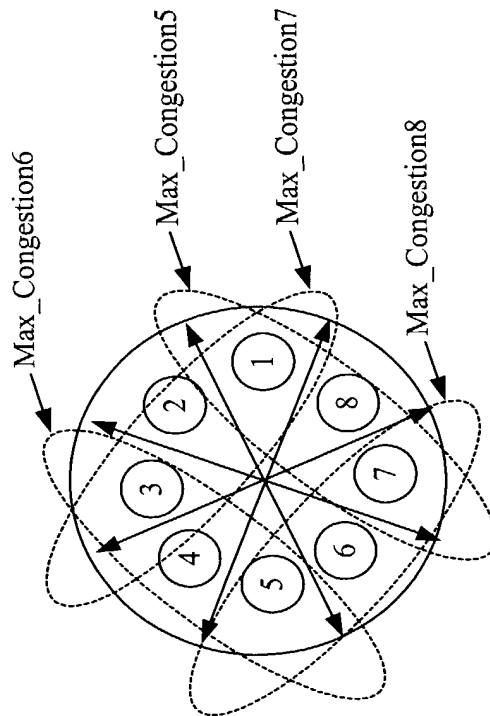


Figure 45

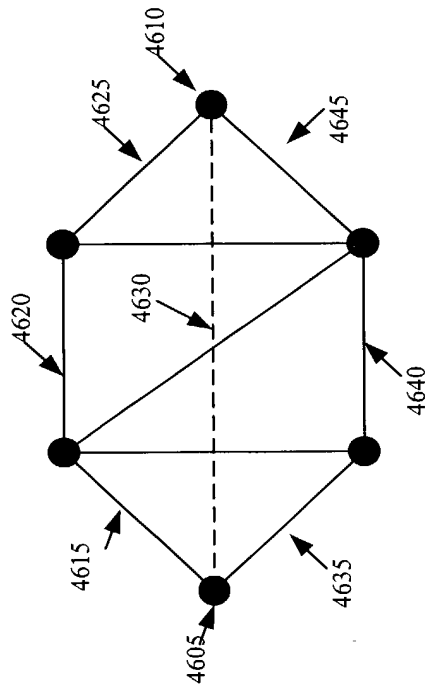


Figure 46

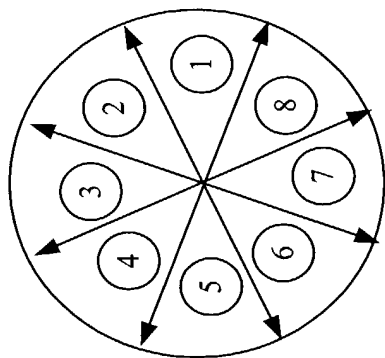
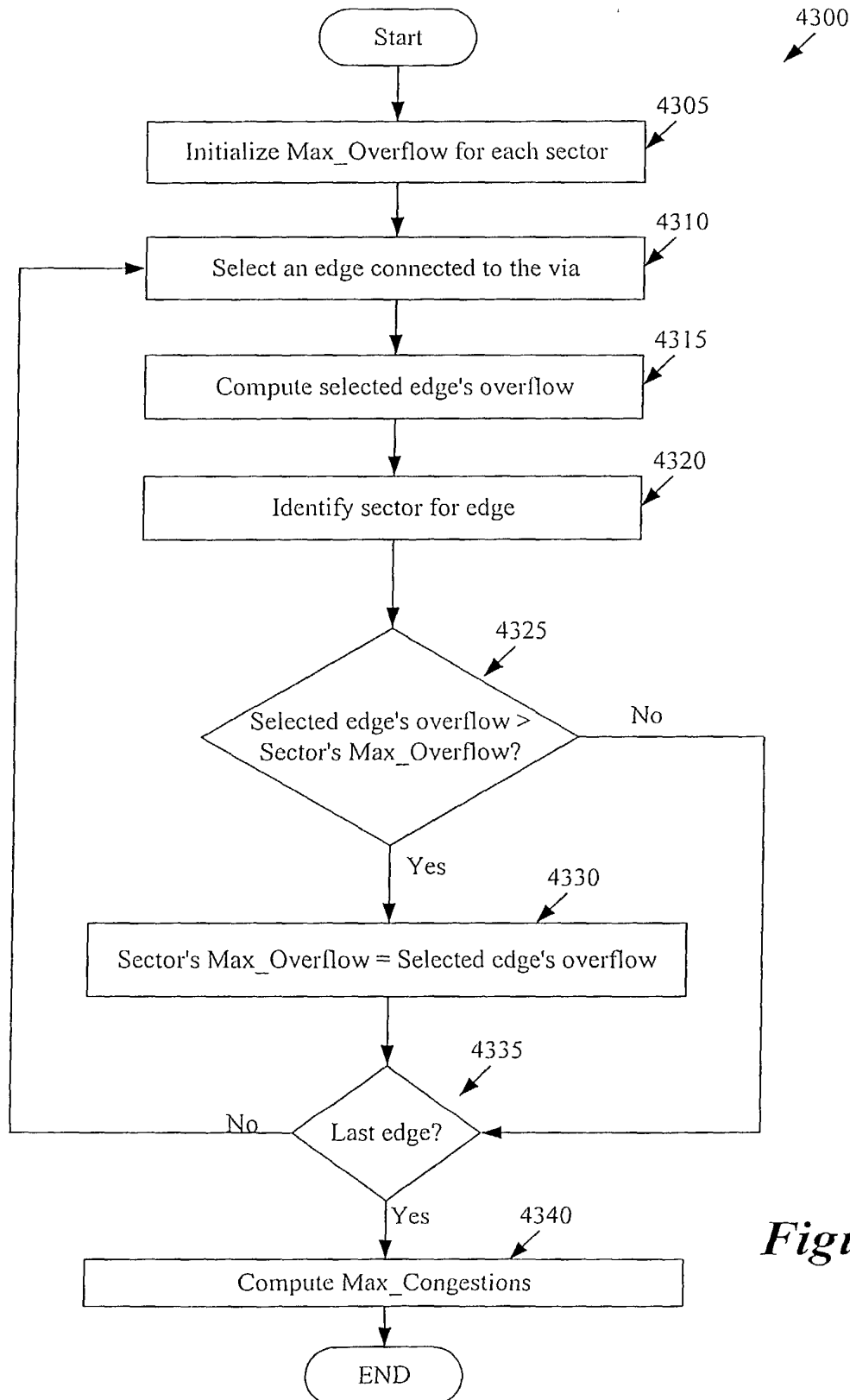


Figure 42

*Figure 43*

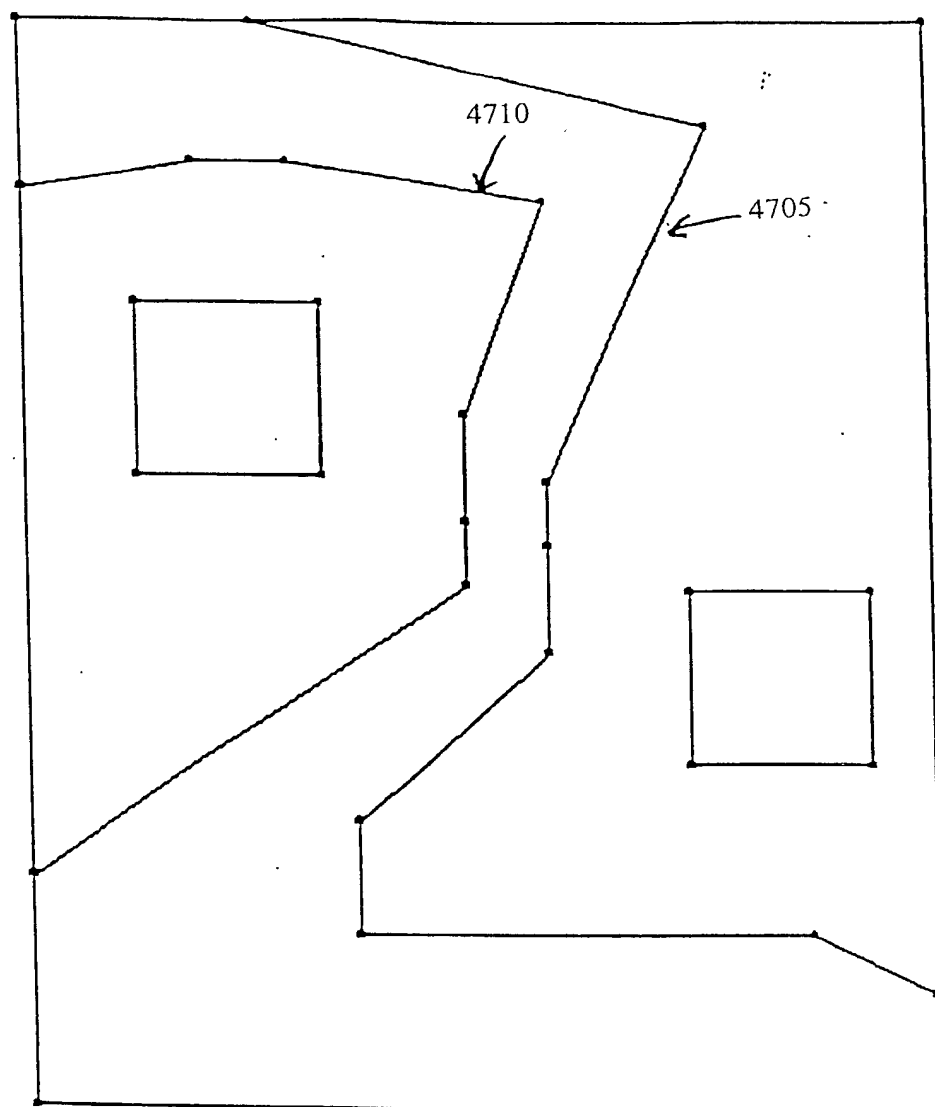


FIGURE 47

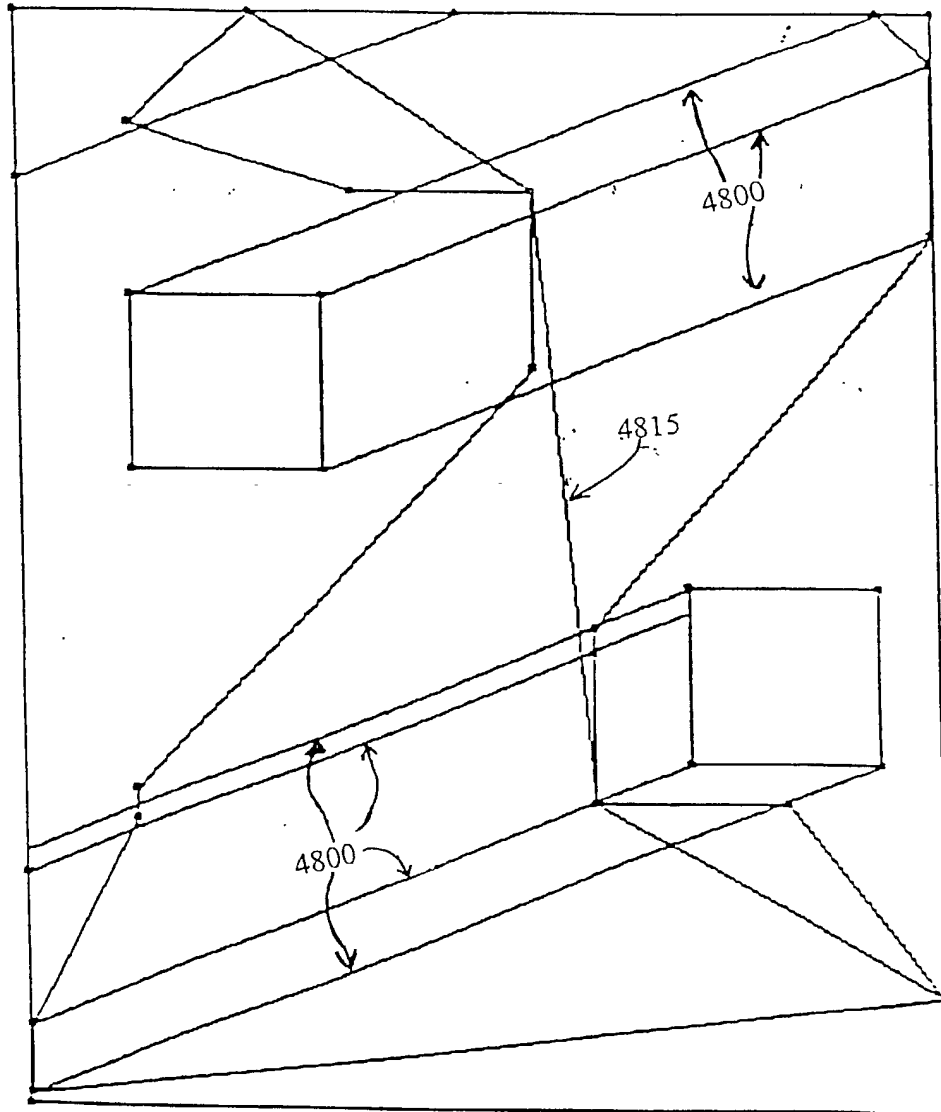


FIGURE 48A

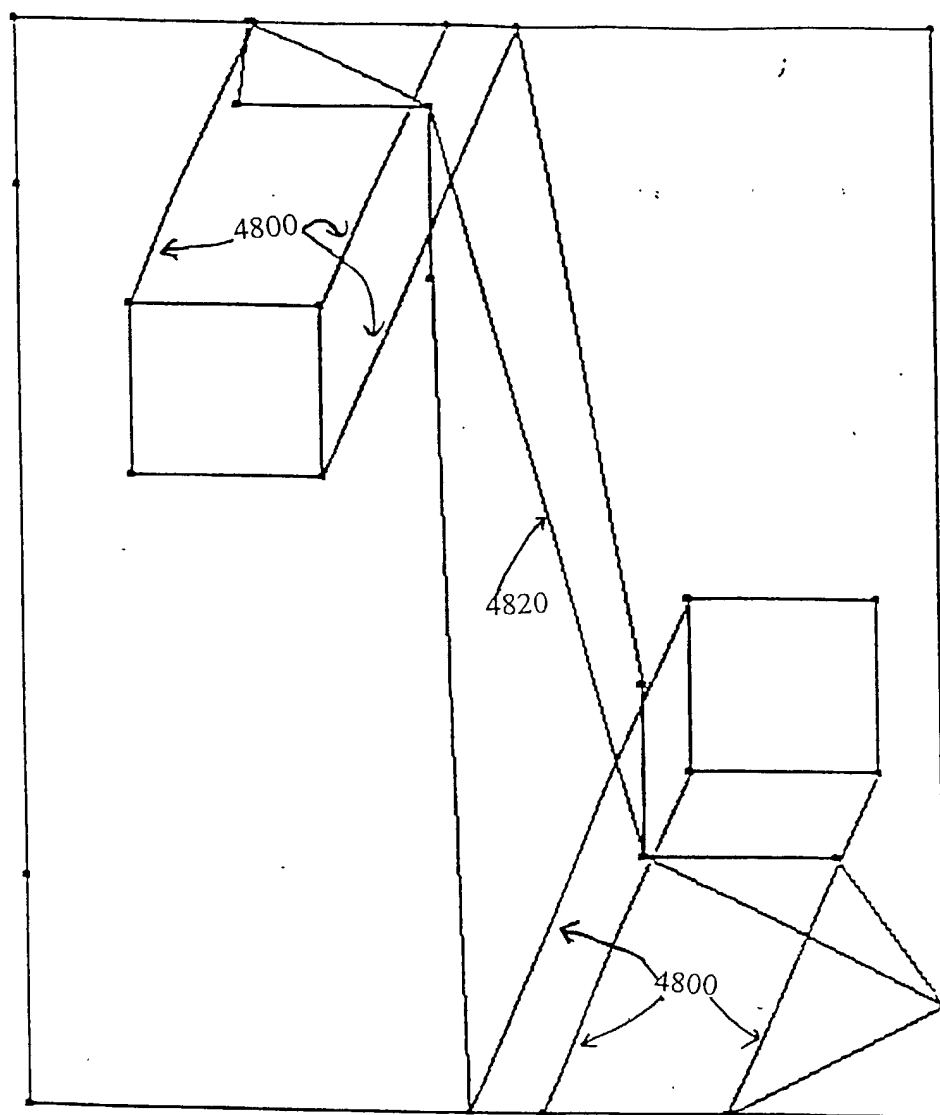


FIGURE 48B

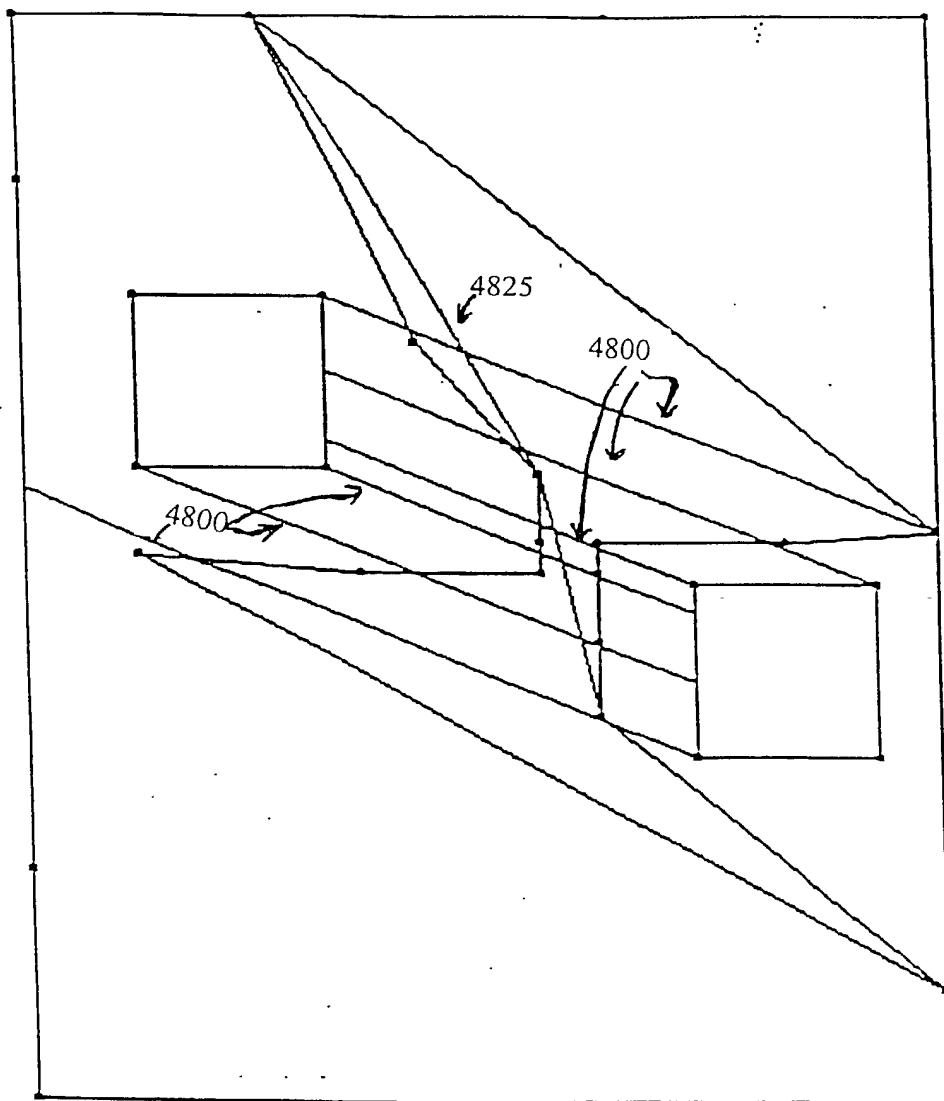


FIGURE 48C

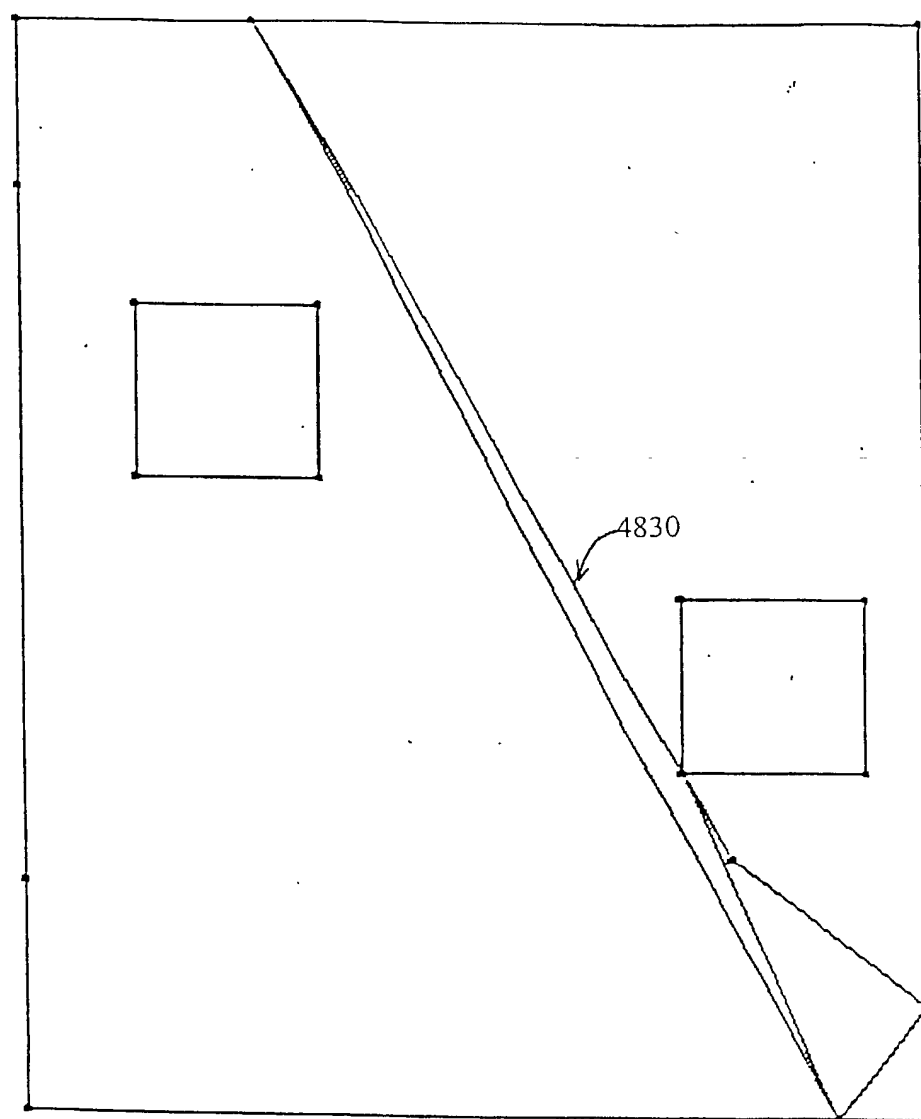


FIGURE 48D

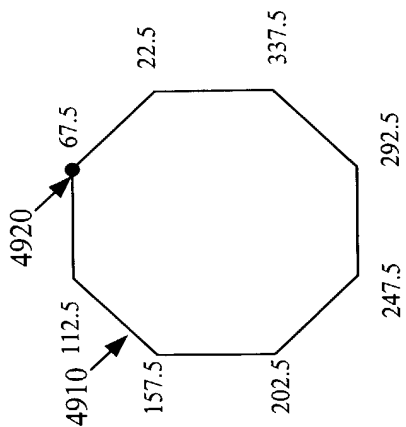


Figure 49A

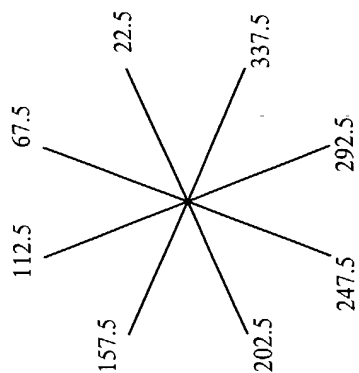


Figure 49C

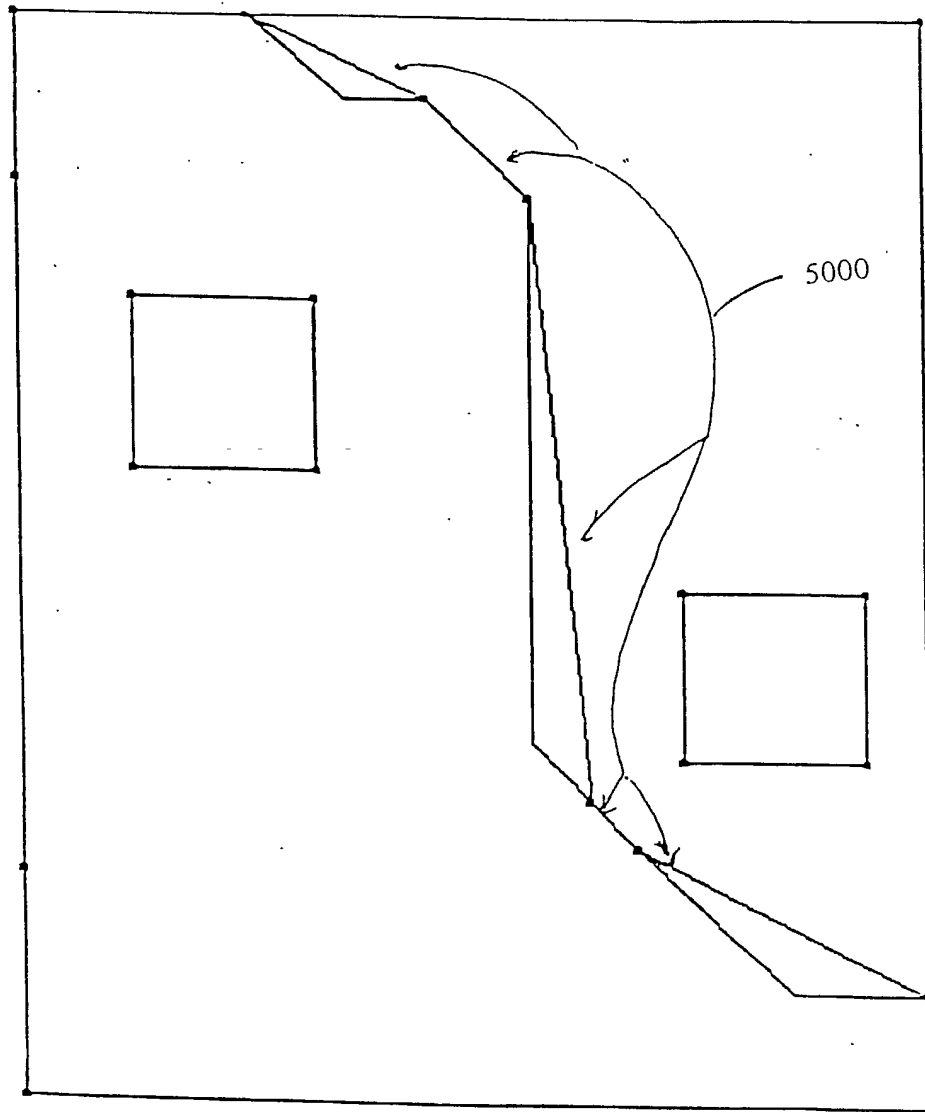


FIGURE 50

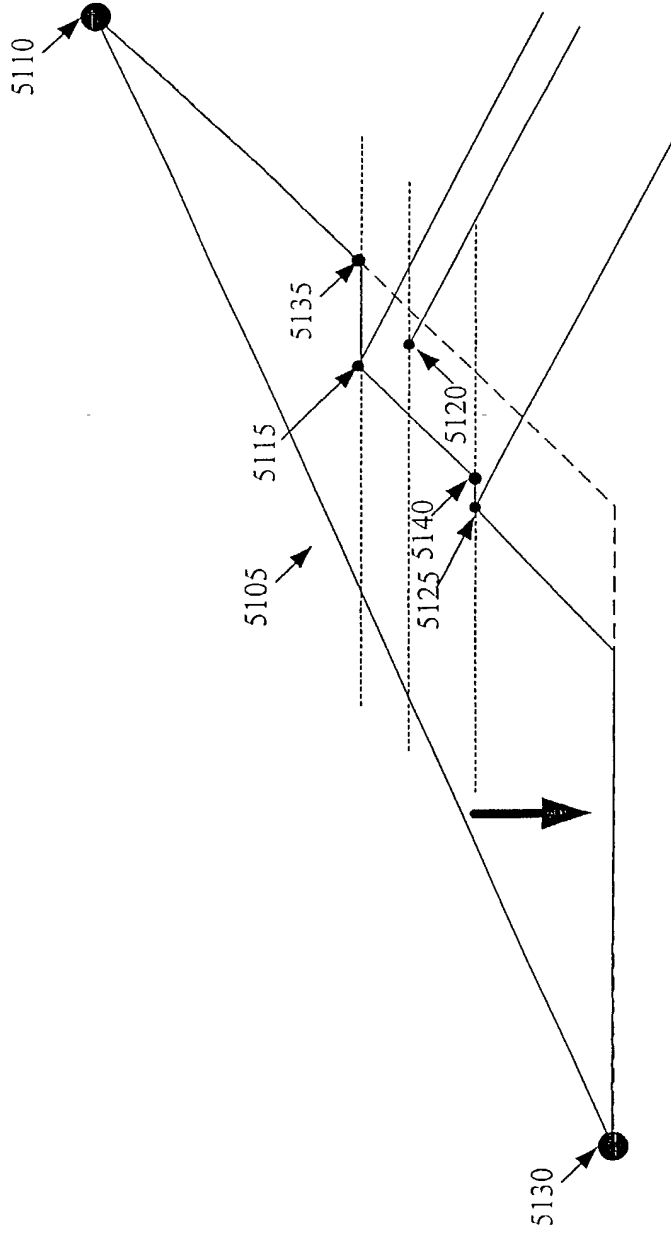


Figure 51

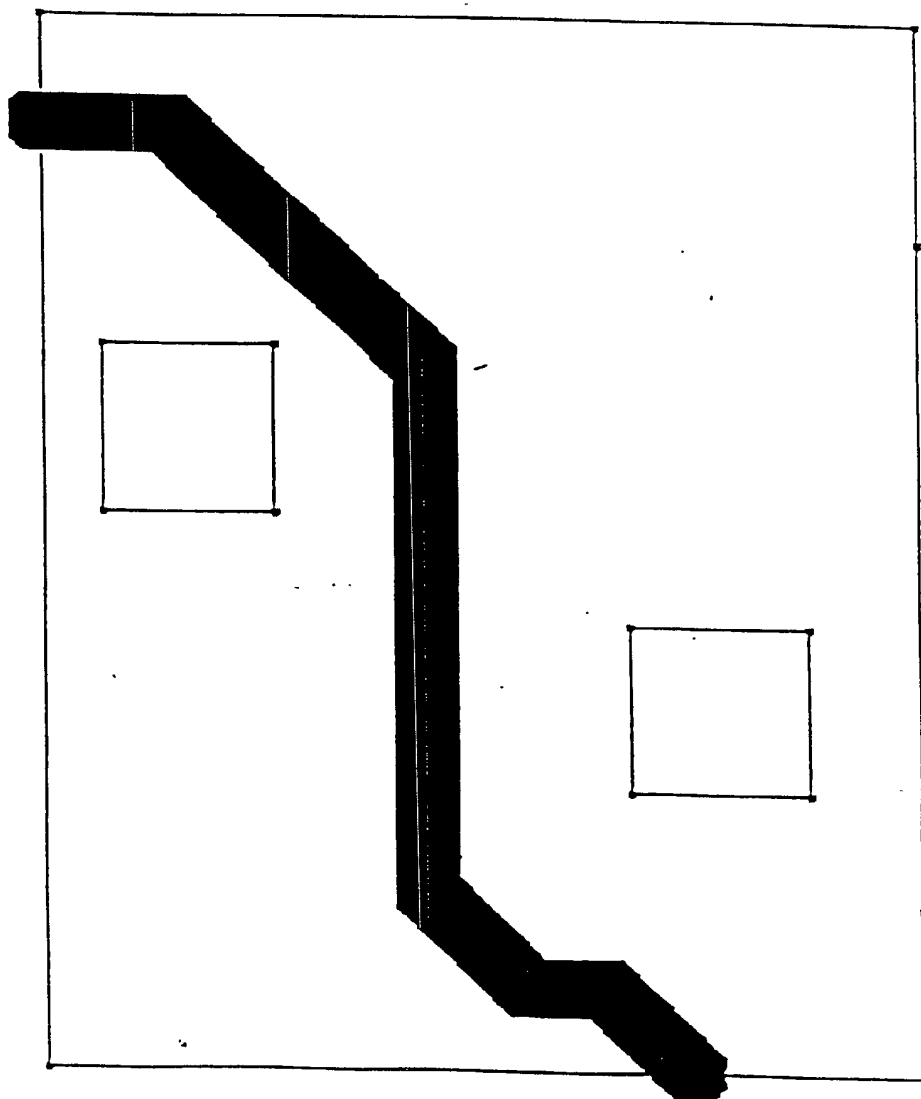


FIGURE 52

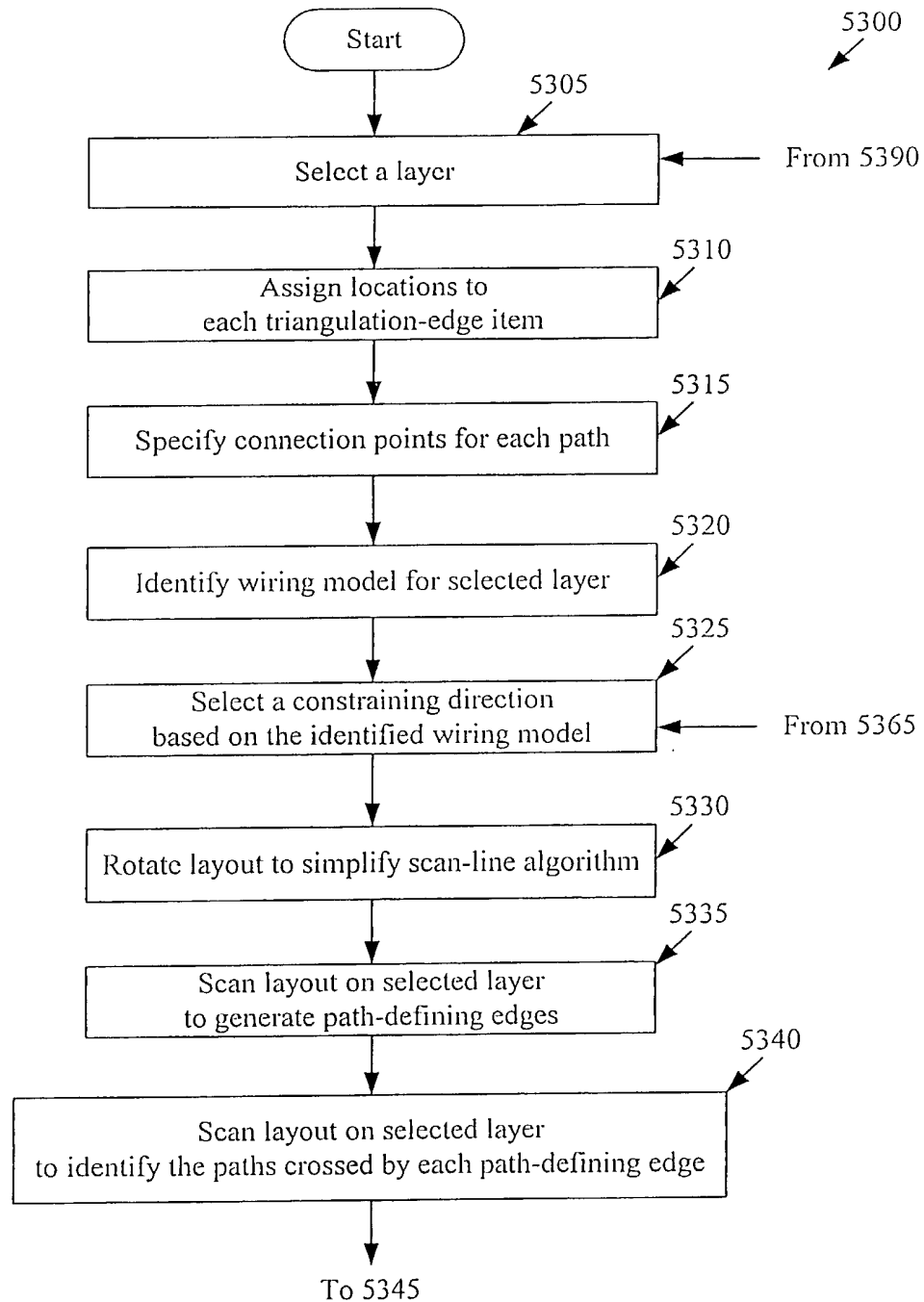
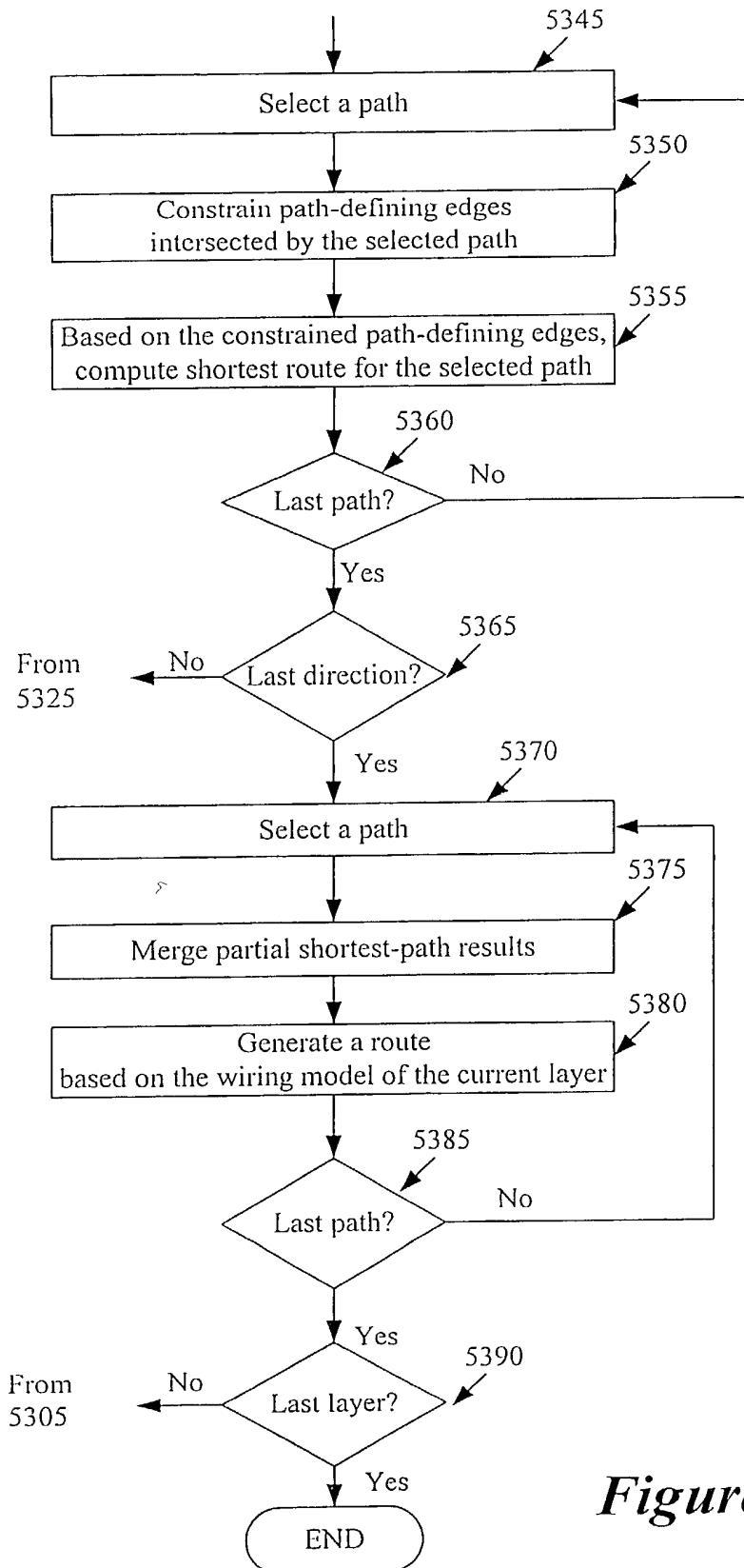


Figure 53

Figure 53: Figure 53A
Figure 53B

*Figure 53B*

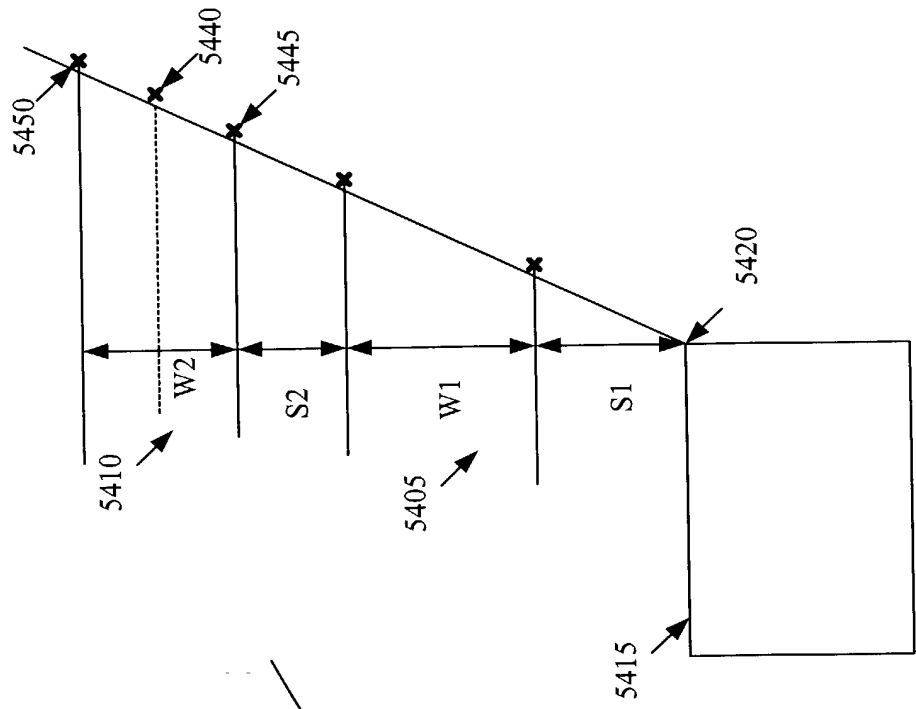


Figure 55

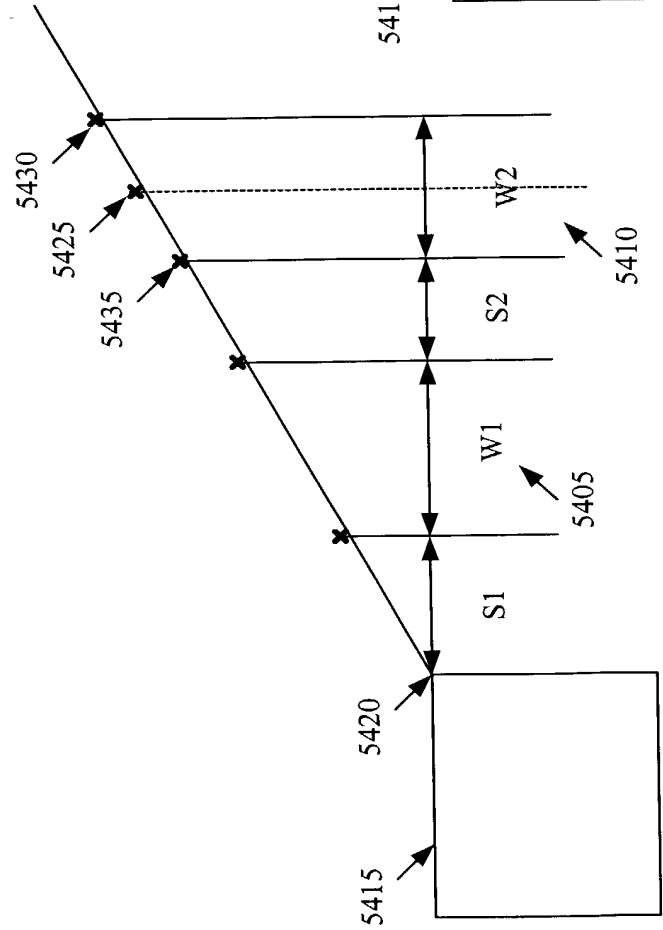


Figure 54

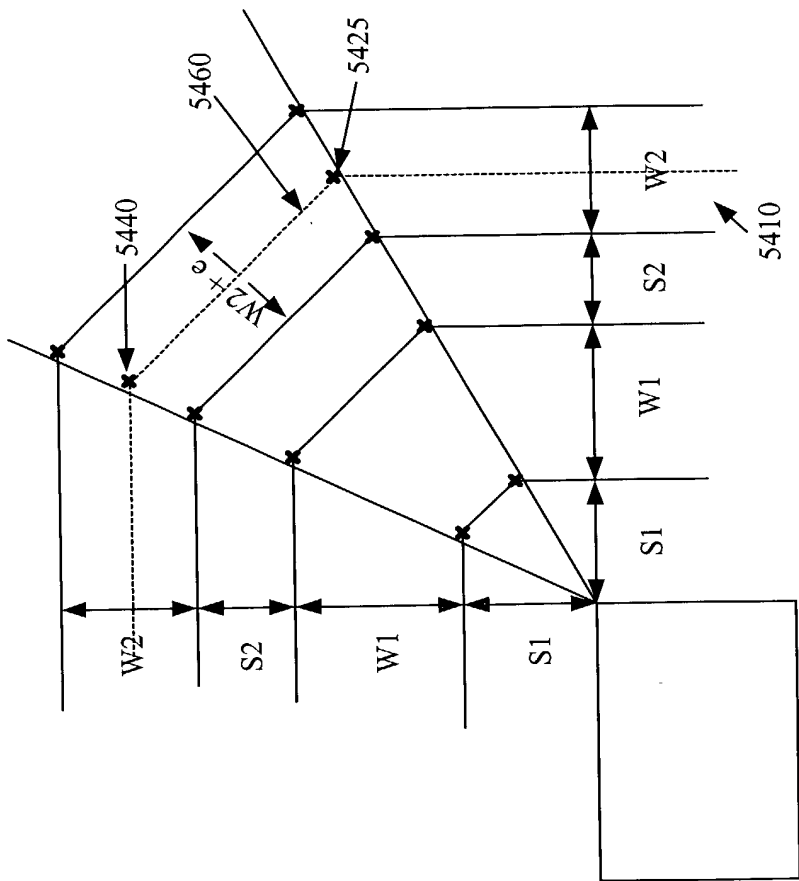


Figure 56

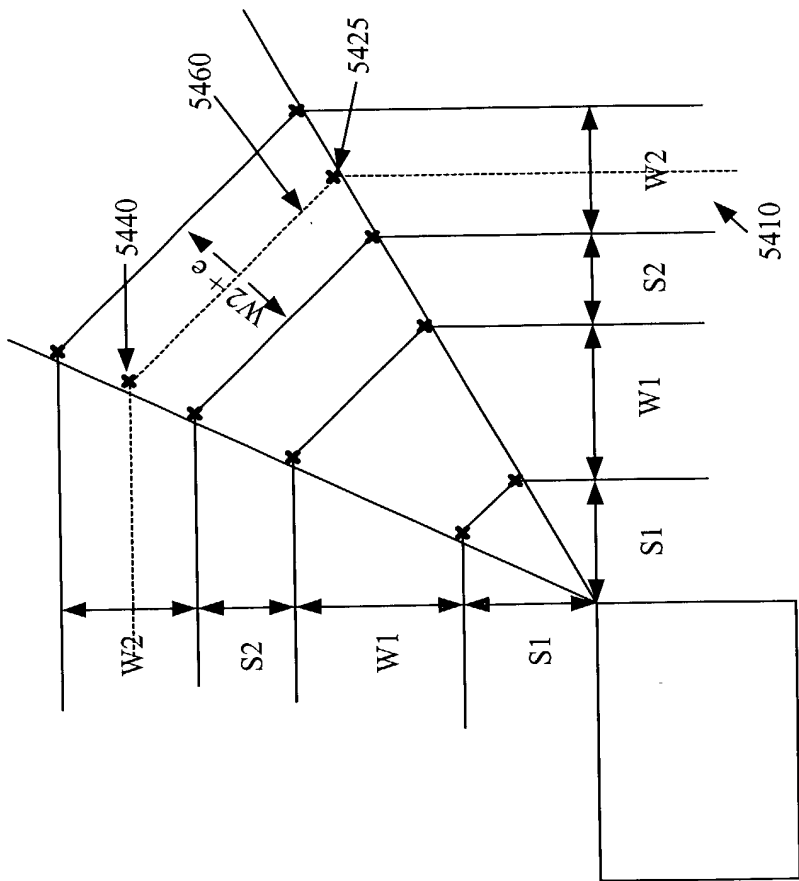


Figure 57

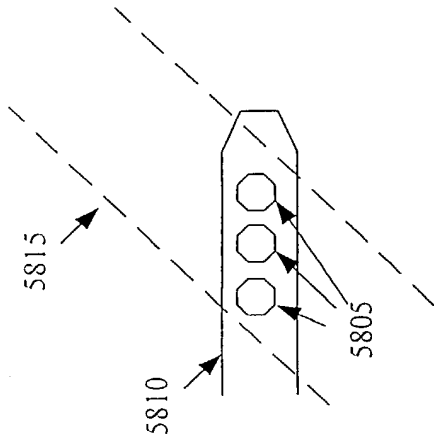


Figure 58

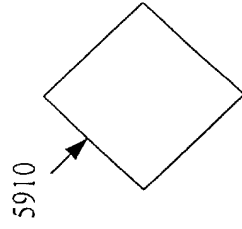
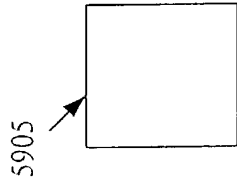


Figure 59

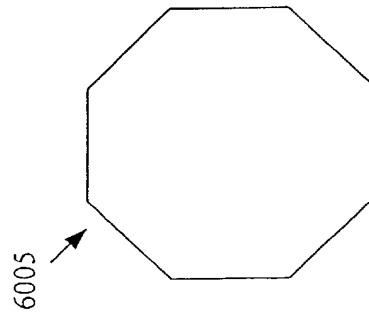


Figure 60

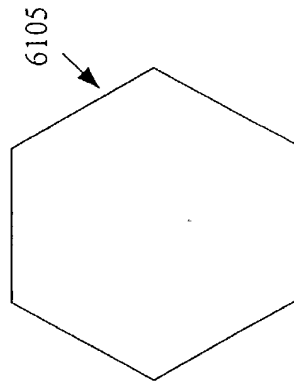


Figure 61

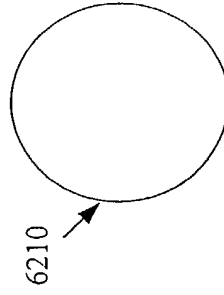


Figure 62

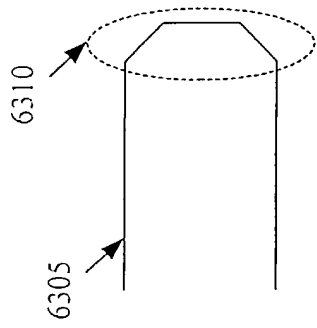


Figure 63

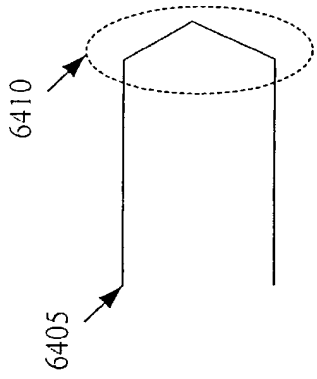


Figure 64

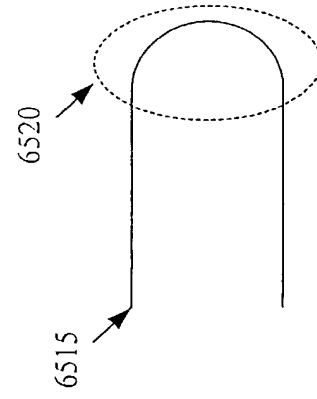
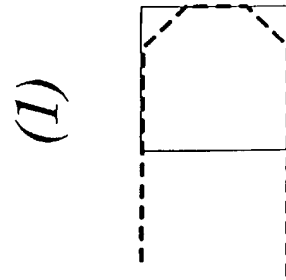
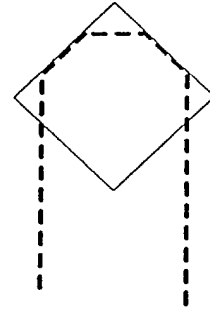


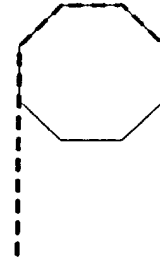
Figure 65



(1)



(2)



(3)

Figure 66



Figure 67

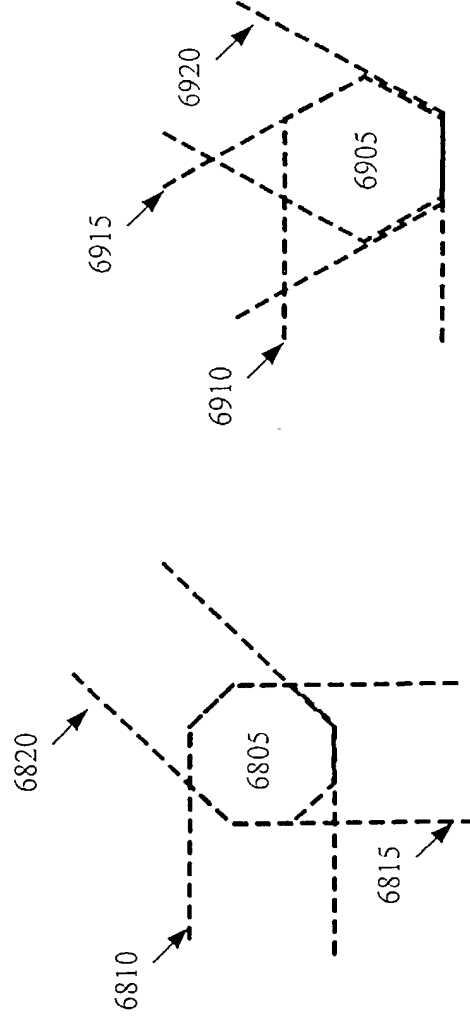
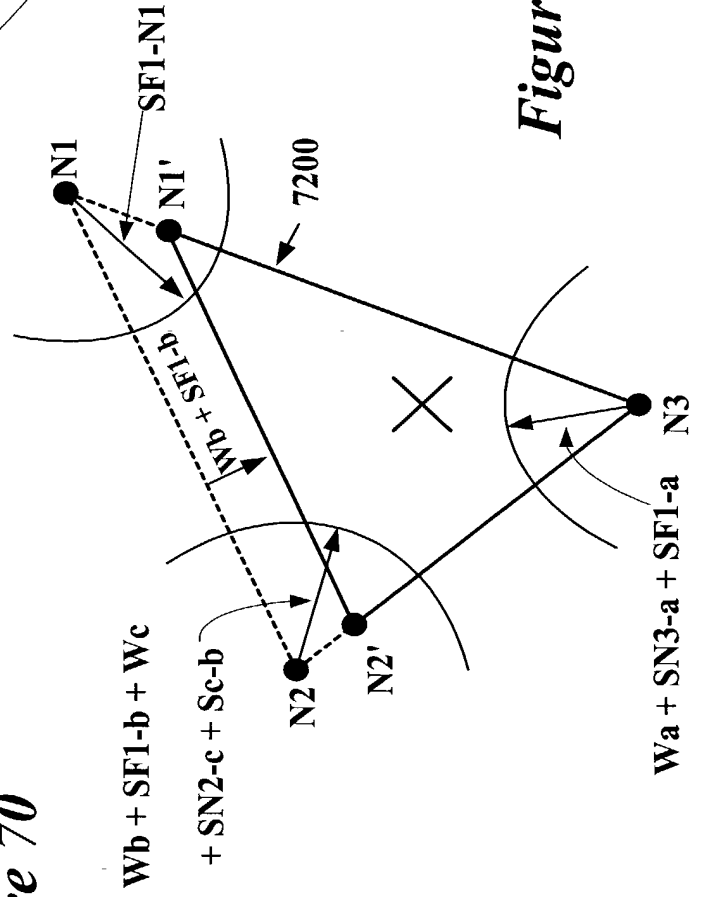
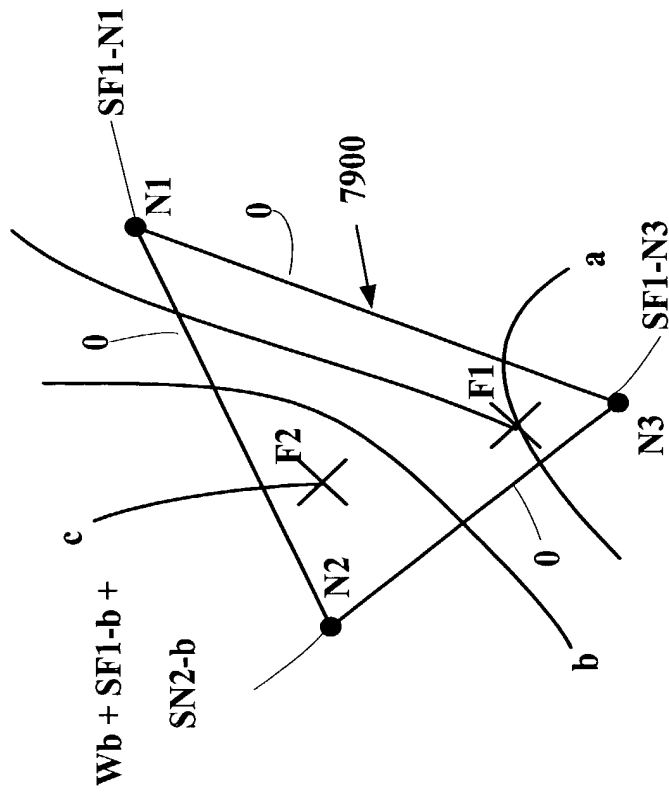
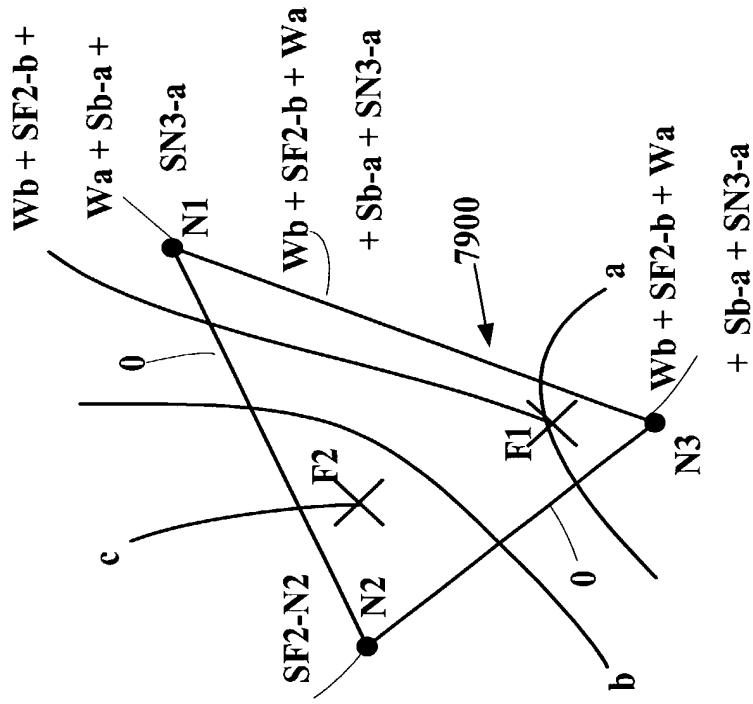


Figure 68

Figure 69







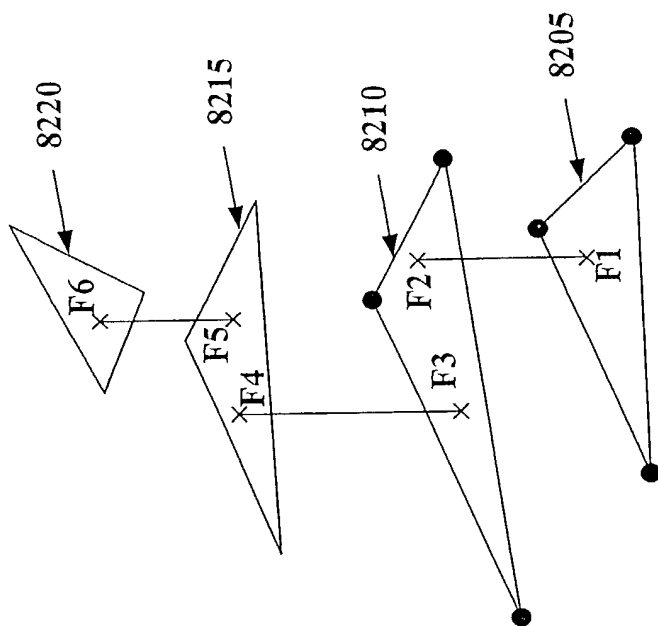


Figure 81

Figure 82

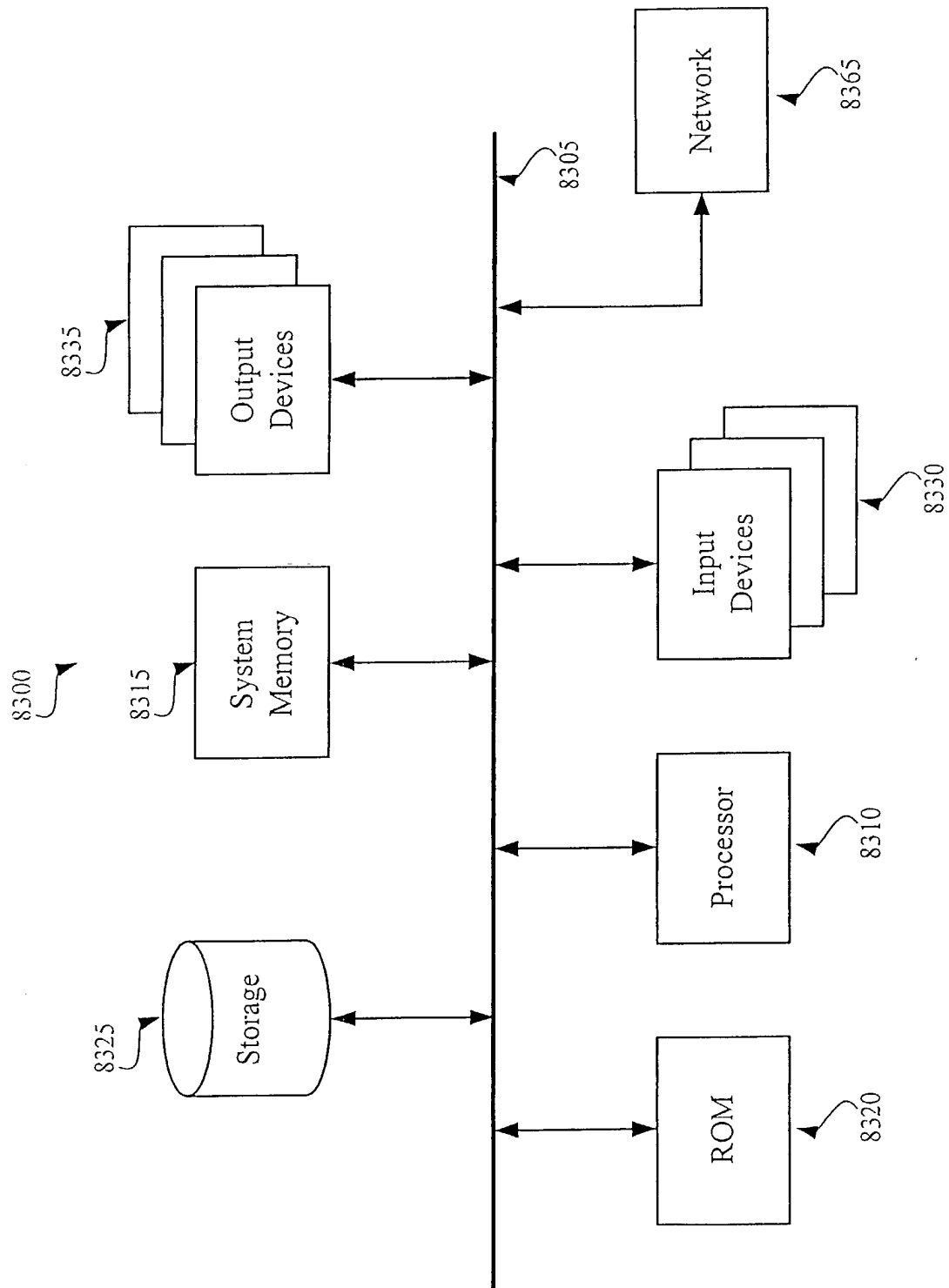


Figure 83